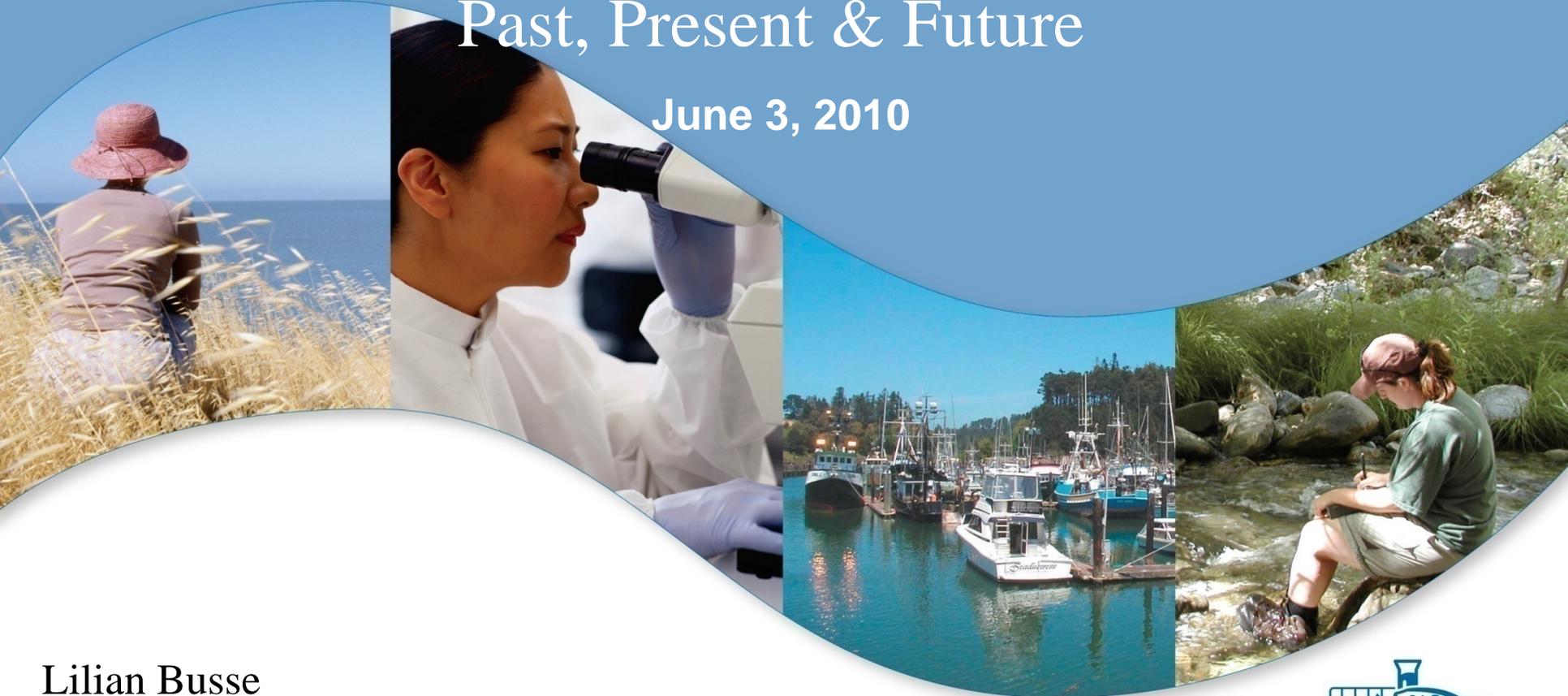


# SWAMP Monitoring and SWAMP Leveraged Monitoring in the San Diego Region – Past, Present & Future

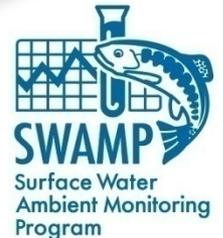
June 3, 2010



Lilian Busse  
SWAMP Coordinator, San Diego Region

[lbusse@waterboards.ca.gov](mailto:lbusse@waterboards.ca.gov)

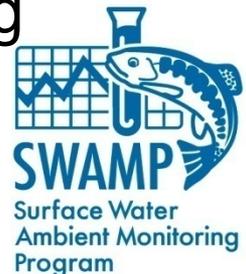
Phone: 858-467-2971



# Outline

**GOAL:** Inform stakeholders on SWAMP monitoring activities in the San Diego region

1. Background on the San Diego region
2. Introduction into SWAMP
3. Statewide SWAMP monitoring
4. San Diego region's SWAMP monitoring
  - a. past projects: 2001-2008
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7. Use of San Diego region's SWAMP data



## Before we start...

- Difference between targeted and probabilistic monitoring design

### Targeted Design

use fixed (targeted) stations, focus on describing localized impacts, and assessing compliance with regulatory guidelines or limits.

### Probabilistic Design

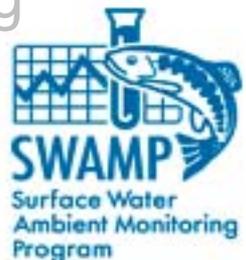
draw sampling stations at random from an area or region, broader regional assessments of overall ambient condition



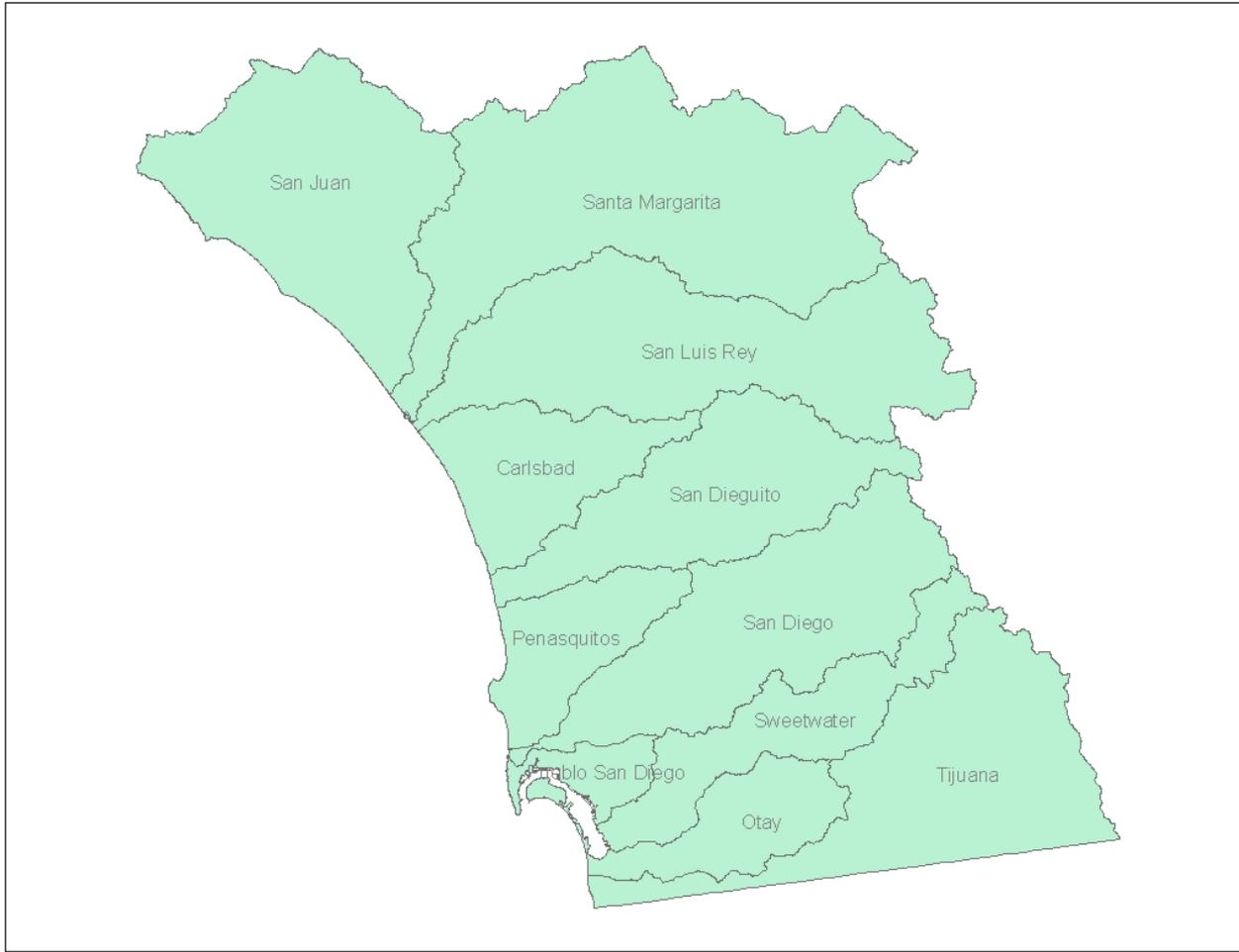
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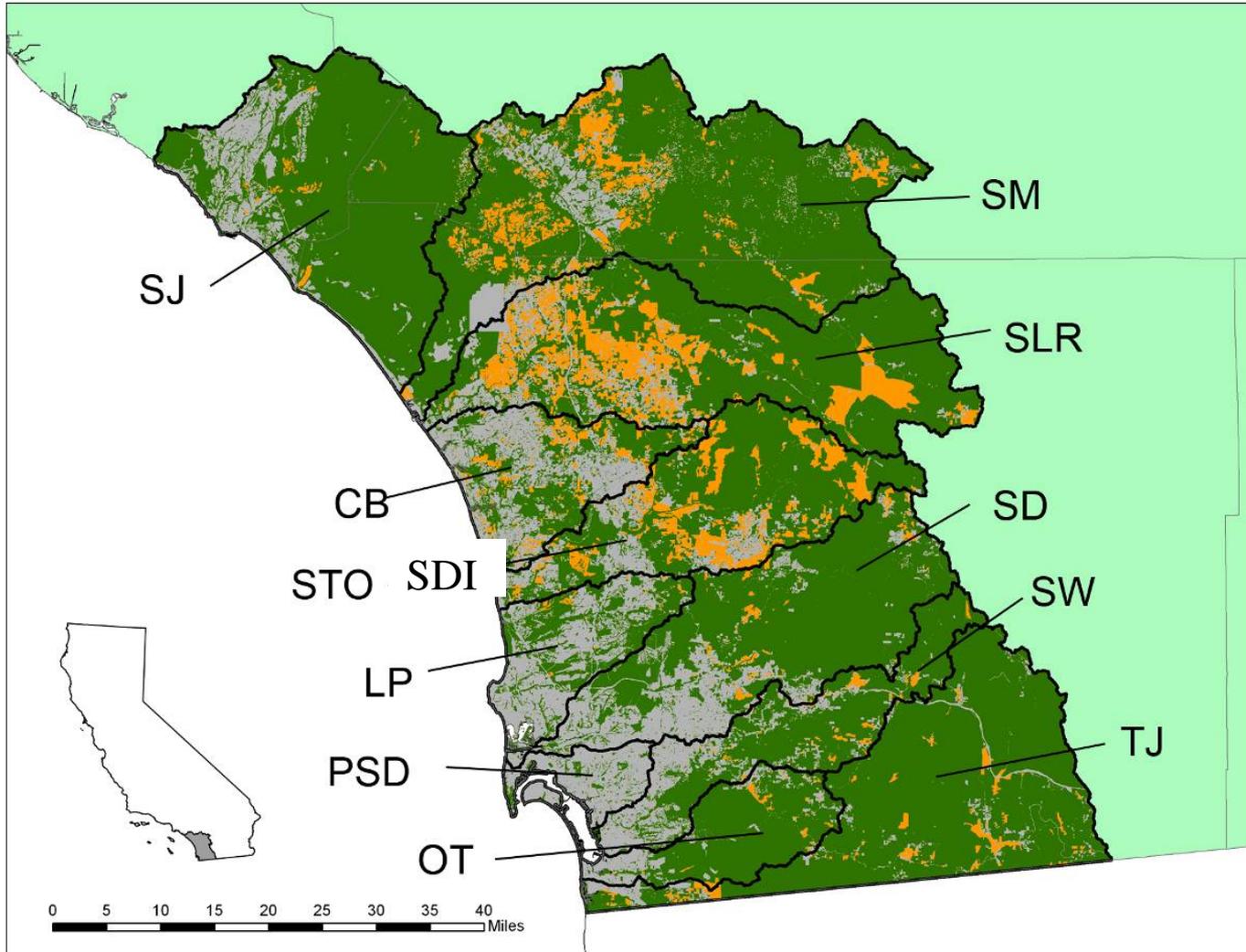
# San Diego Hydrologic Units



- 4,000 sq. miles
- small, but pollution pressure is on!
- Population size: 2 Mio. in 2004 (3 Mio. by 2030)
- 2,000 active construction permits
- 1,000 industrial permits
- over 100/year 401s applications received

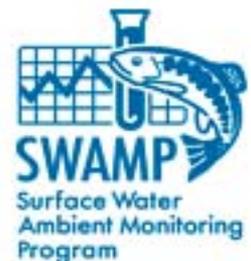


# San Diego Hydrologic Units and Land Use

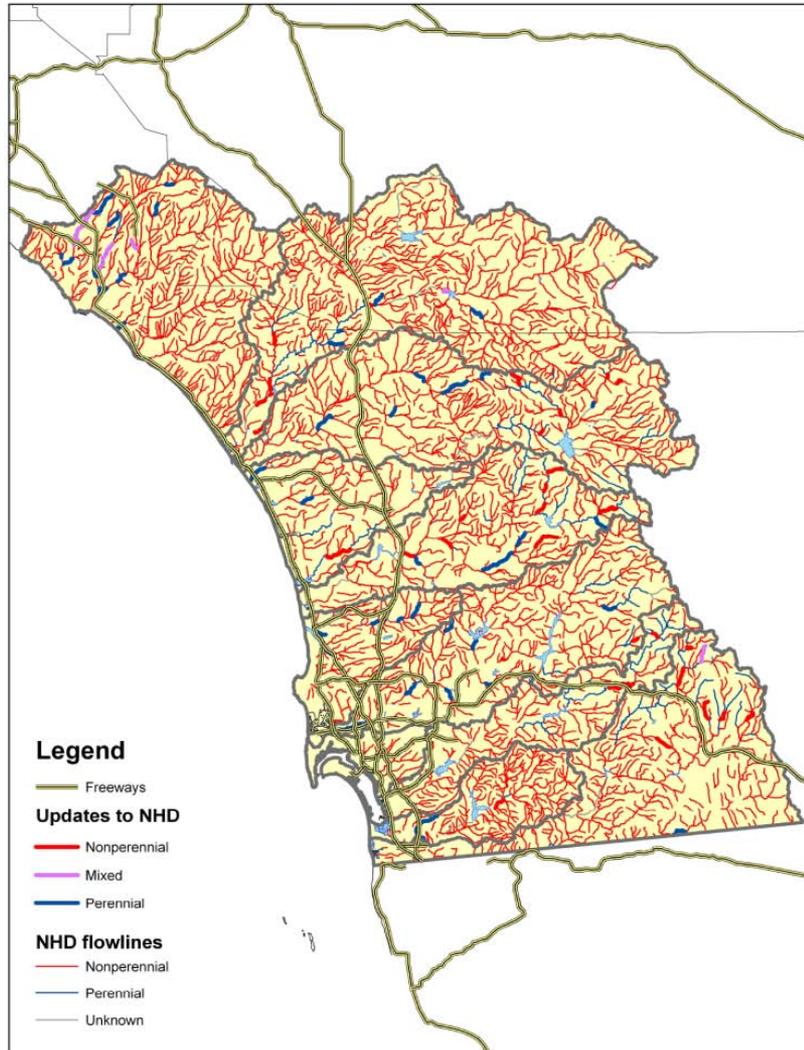


- 23% urban
- 9% agriculture
- 68% open

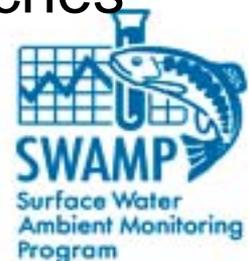
(SWAMP synthesis report, SCCWRP 2008)



# Climate and Precipitation



- Mild climate with average (65 °F)
- Dry period: late April – mid October
- Wet period: mid October – late April
- Average rainfall: less than 9 inches

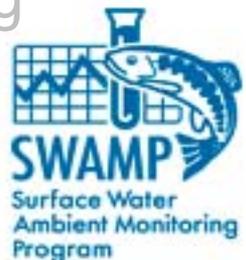


(Mazor 2008)

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# Introduction into SWAMP

- SWAMP: **S**urface **W**ater **A**mbient **M**onitoring **P**rogram
- Started in 2000, required by State Legislature
- Funding: \$8 Million (\$4.2 Million federal funding, \$3.0 Million State funding)
- 9 Regional Coordinators + SWAMP unit at State Board
- SWAMP monitoring is split up into statewide and regional programs

## *Mission:*

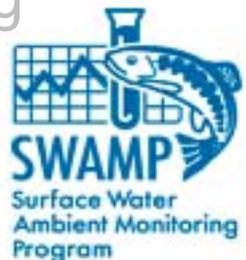
*“The SWAMP mission is to provide resource managers, decision makers, and the public with timely, high-quality information to evaluate the condition of all waters throughout California”*



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**GOAL: Inform stakeholders on SWAMP monitoring activities in the San Diego region**

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# Statewide SWAMP Monitoring

There are 4 large statewide projects:

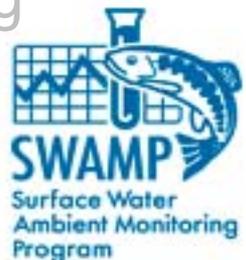
1. Perennial Stream Assessment (PSA)
2. Reference Conditions Management Plan (RCMP)
3. Stream Pollution Trend Monitoring (SPoT)
4. Bioaccumulation in Sport Fish (Lakes Study)



# Outline

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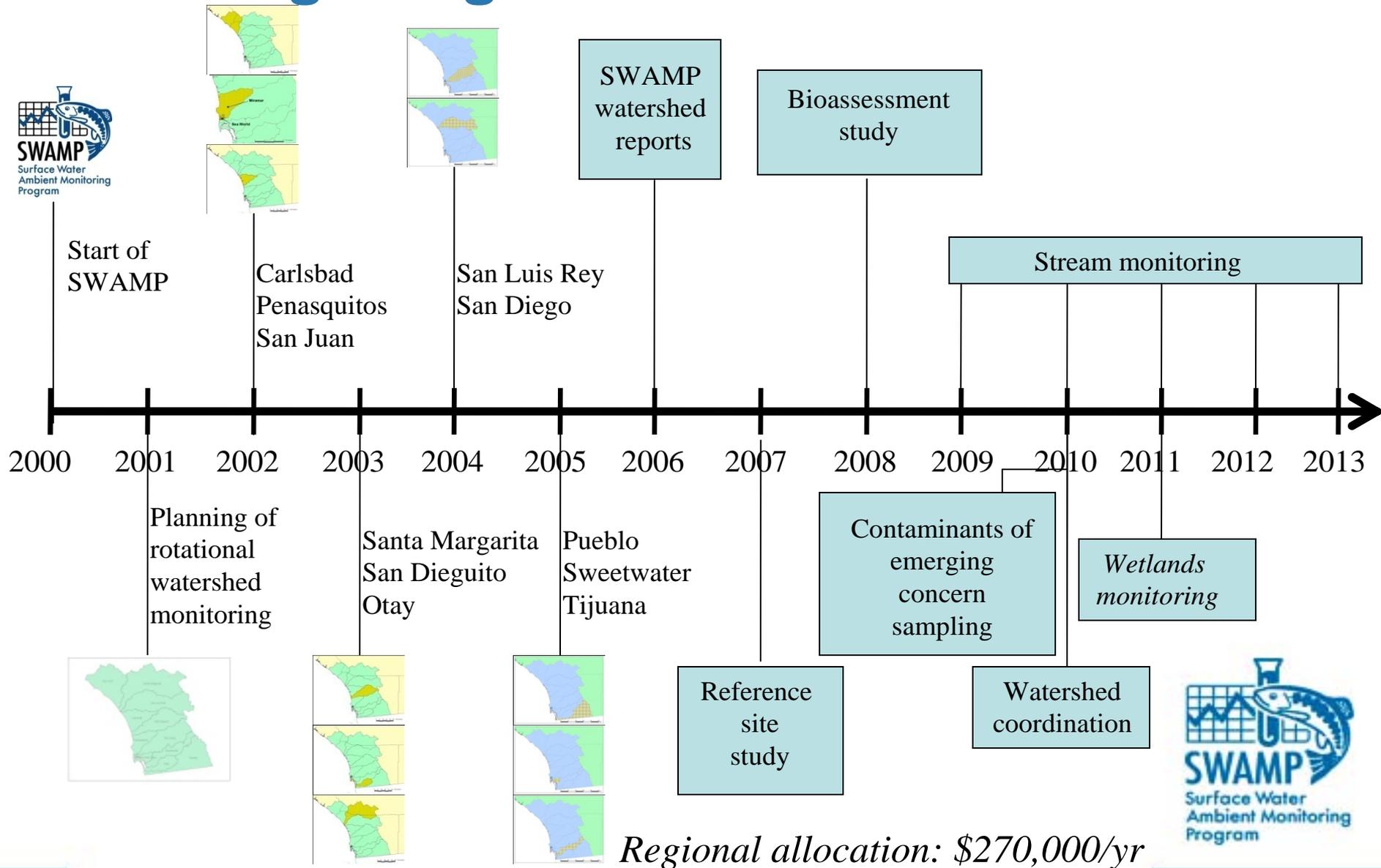
# Monitoring in the San Diego Region

1. SDRWQCB\*-directed monitoring programs
  - conducted by the SDRWQCB or for the SDRWQCB by consultants
  - funding from the SDRWQCB (lab contracts and **SWAMP**)
  - ~\$350,000
2. SDRWQCB\*-required programs
  - required by permits (NPDES, 401 water quality certifications, TMDL, etc.)
  - funding through permit holders
  - ~ several Million \$\$

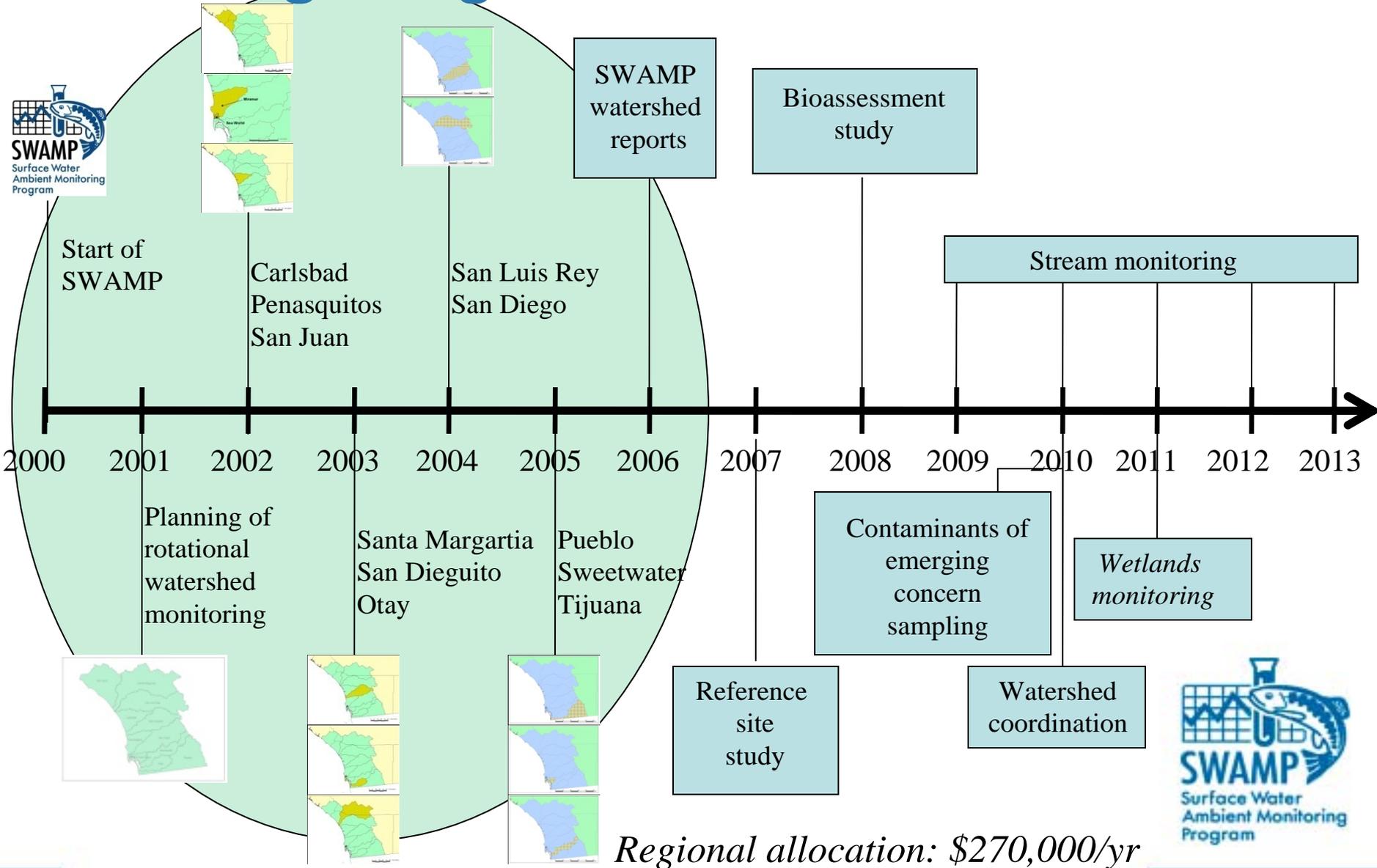
\*SDRWQCB=San Diego Regional Water Quality Control Board



# San Diego Region SWAMP Timeline



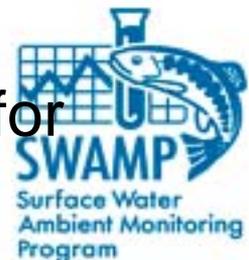
# San Diego Region SWAMP Timeline



# Rotational Watershed Monitoring

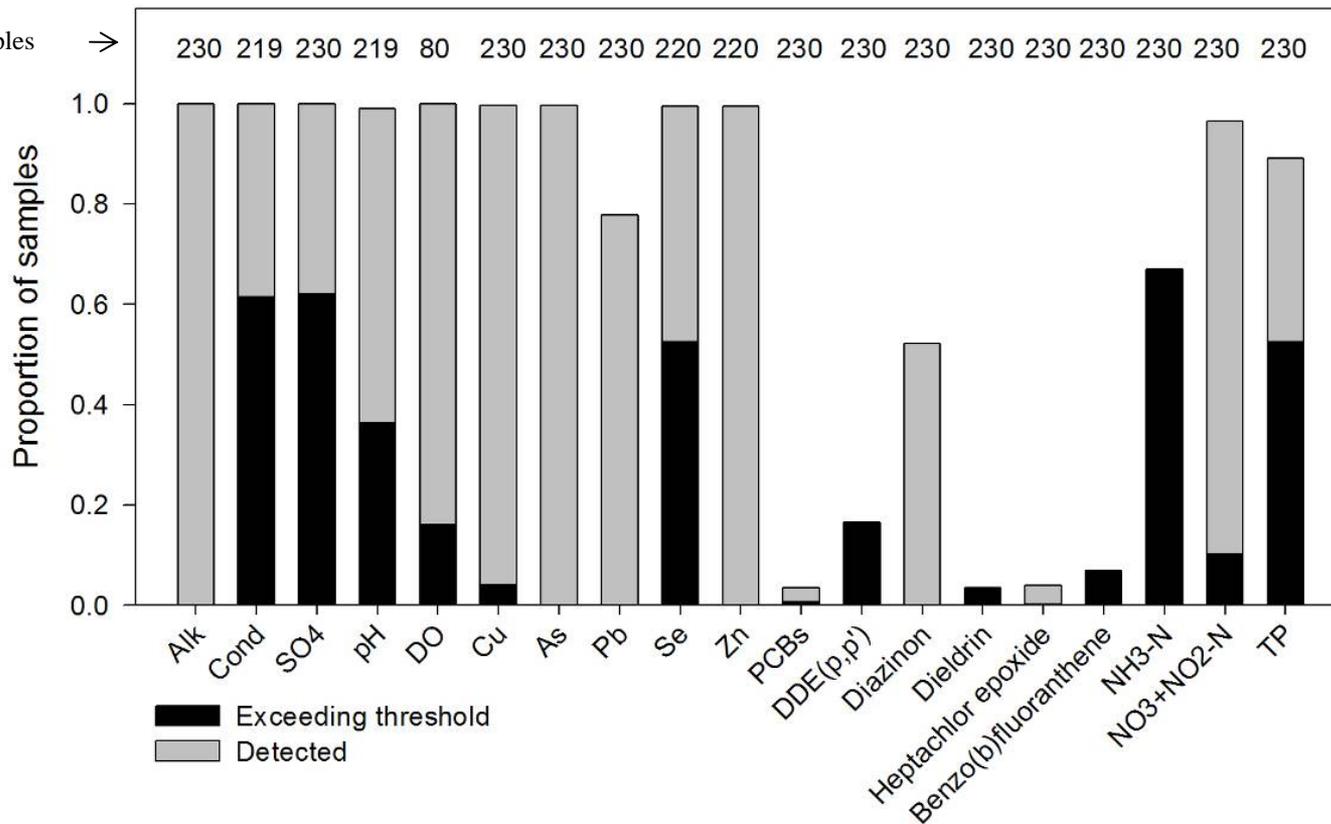
**GOAL:** Assessment of ecological health of streams in San Diego region watersheds

- targeted design, 2-3 watersheds/year, 2-4 sites per watershed, 2 dry and 2 wet sampling events
- Parameters:
  - conventional water chemistry (nutrients, pesticides, metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs))
  - toxicity (water and sediment)
  - bioassessment (benthic macroinvertebrates, incl. physical habitat)
  - tissue samples (at some sites)
- Results were summarized in watershed reports (one for each watershed), and a synthesis report prepared by Southern California Coastal Water Research Project

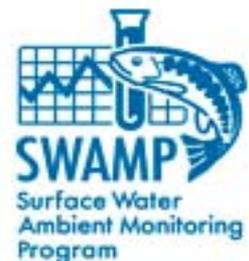


# Samples that are Exceeding Thresholds

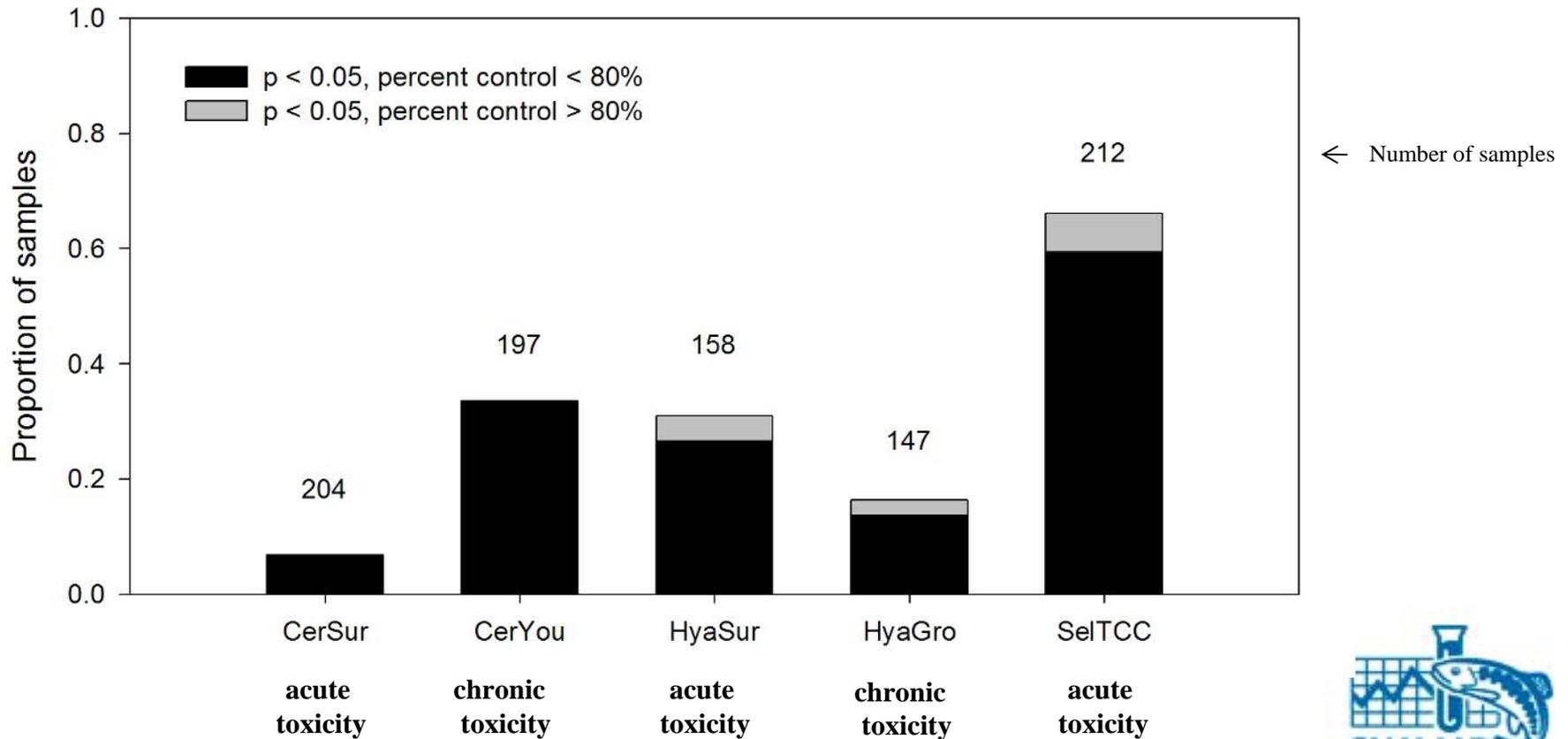
Number of samples →



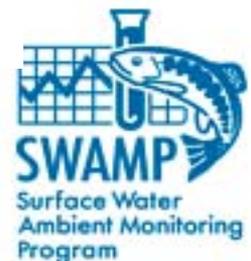
(Mazor & Schiff 2008)



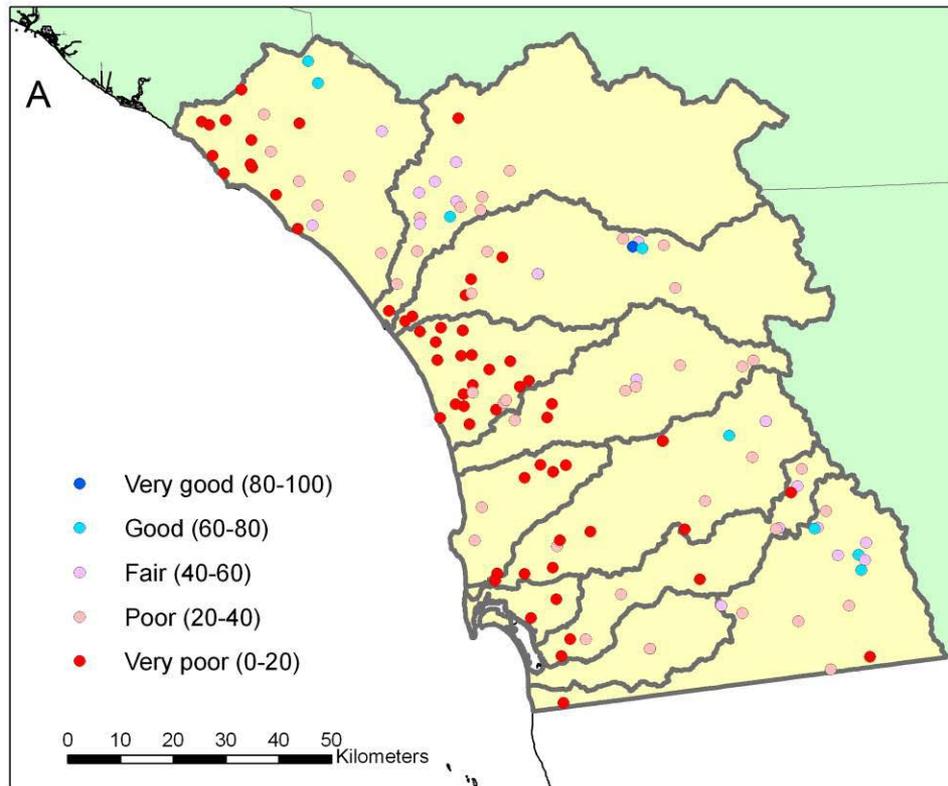
# Water and Sediment Toxicity



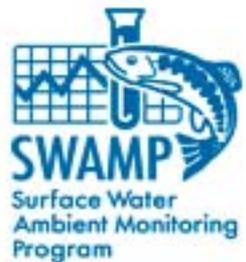
(Mazor & Schiff 2008)



# Ecological Health

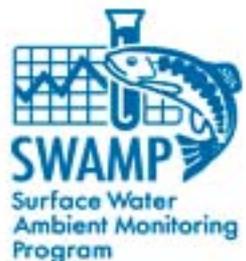


(Mazor & Schiff 2008)



# Conclusions from Rotational Watershed Monitoring

- Most sites within the San Diego region were in poor condition based on multiple lines of evidence
  - 50% of all water samples exceeded one or more aquatic life thresholds
  - Persistent water or sediment toxicity
  - 80% of bioassessment samples were in poor or very poor condition
- Results show strong correlations of benthic macroinvertebrates to toxic contaminants in the water column (e.g. trace metals or organic contaminants), and eutrophication (nutrients and low dissolved oxygen)



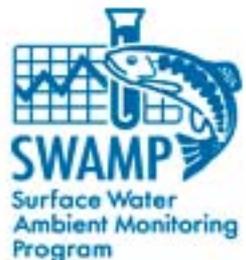
# Recommendations from Rotational Watershed Monitoring

- SWAMP monitoring should integrate with other monitoring programs in the region
- Use probabilistic design for monitoring
- Identify set of indicators (e.g. bioassessment including algae)
- Infrastructure needed to support collaborative programs (information management)

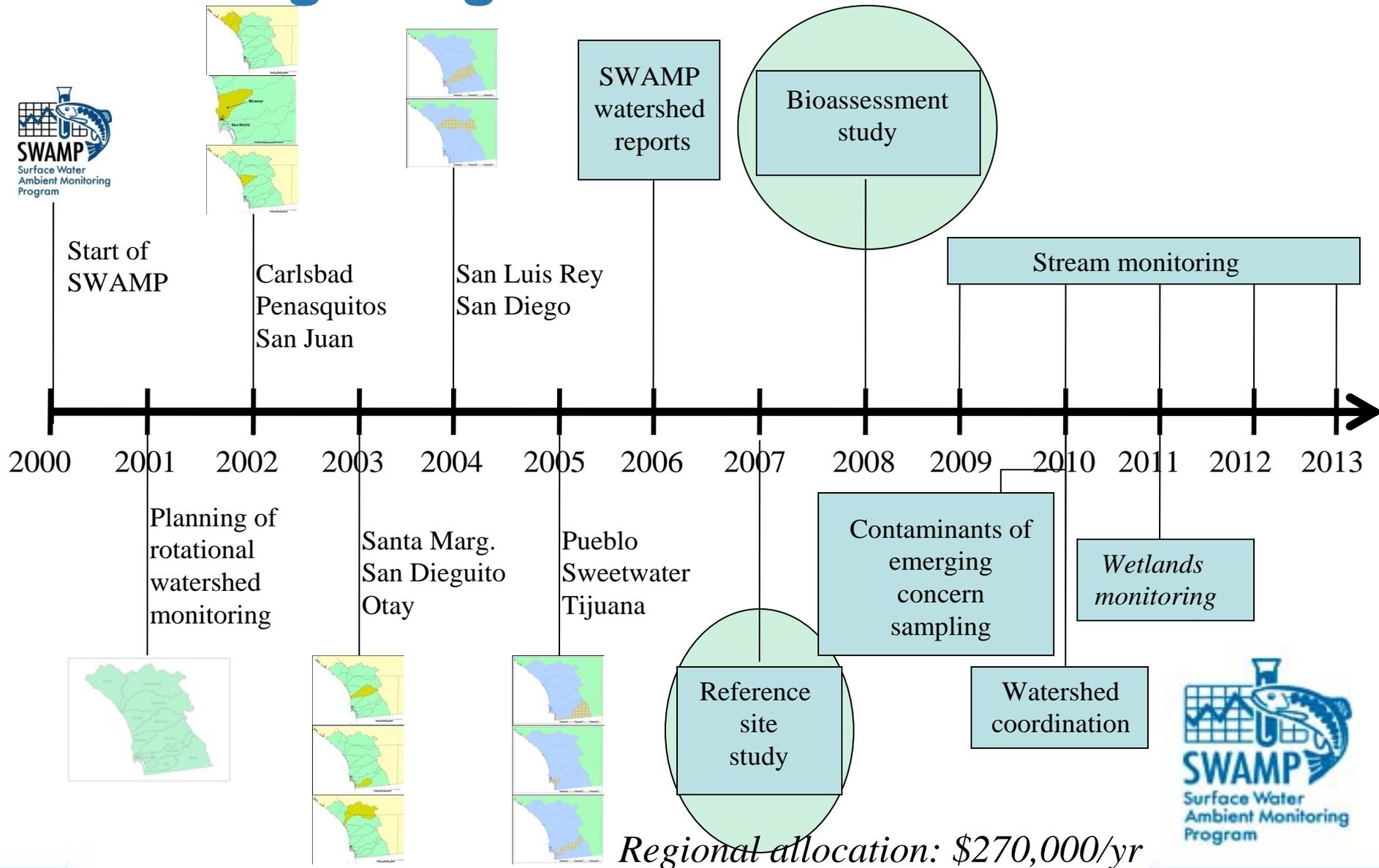


# Recommendations from Rotational Watershed Monitoring

- SWAMP monitoring should integrate with other monitoring programs in the region
  - participation in a regional bioassessment study, SWAMP \$\$ for improved watershed coordination
- Use probabilistic design for monitoring
  - design of probabilistic bioassessment study
- Identify set of indicators (e.g. bioassessment including algae)
  - focus on bioassessment including algae
- Infrastructure needed to support collaborative programs (information management)
  - Regional Data Portal



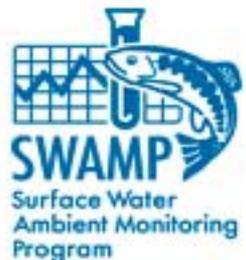
# San Diego Region SWAMP Timeline



# Bioassessment Studies 2007 and 2008

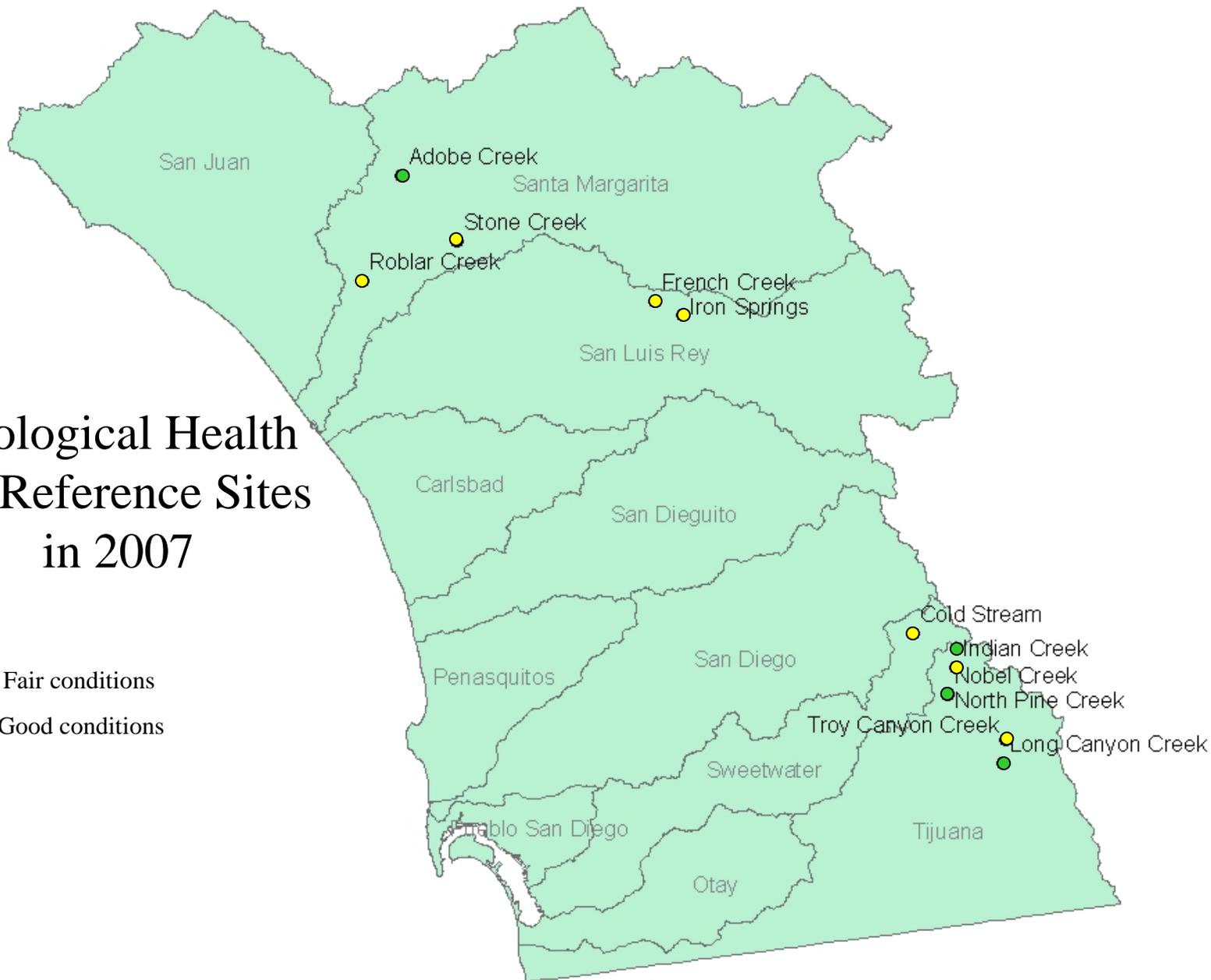
Goal: Long-term trend of ecological health  
at reference and impaired sites

- Targeted design
- 2007: Sampling at reference sites in the San Diego region (11 sites)
- 2008: Sampling at targeted sites throughout the San Diego region (25 sites)
- Parameters:
  - bioassessment incl. physical habitat (benthic macroinvertebrates and algae)
  - conventional water chemistry and caffeine

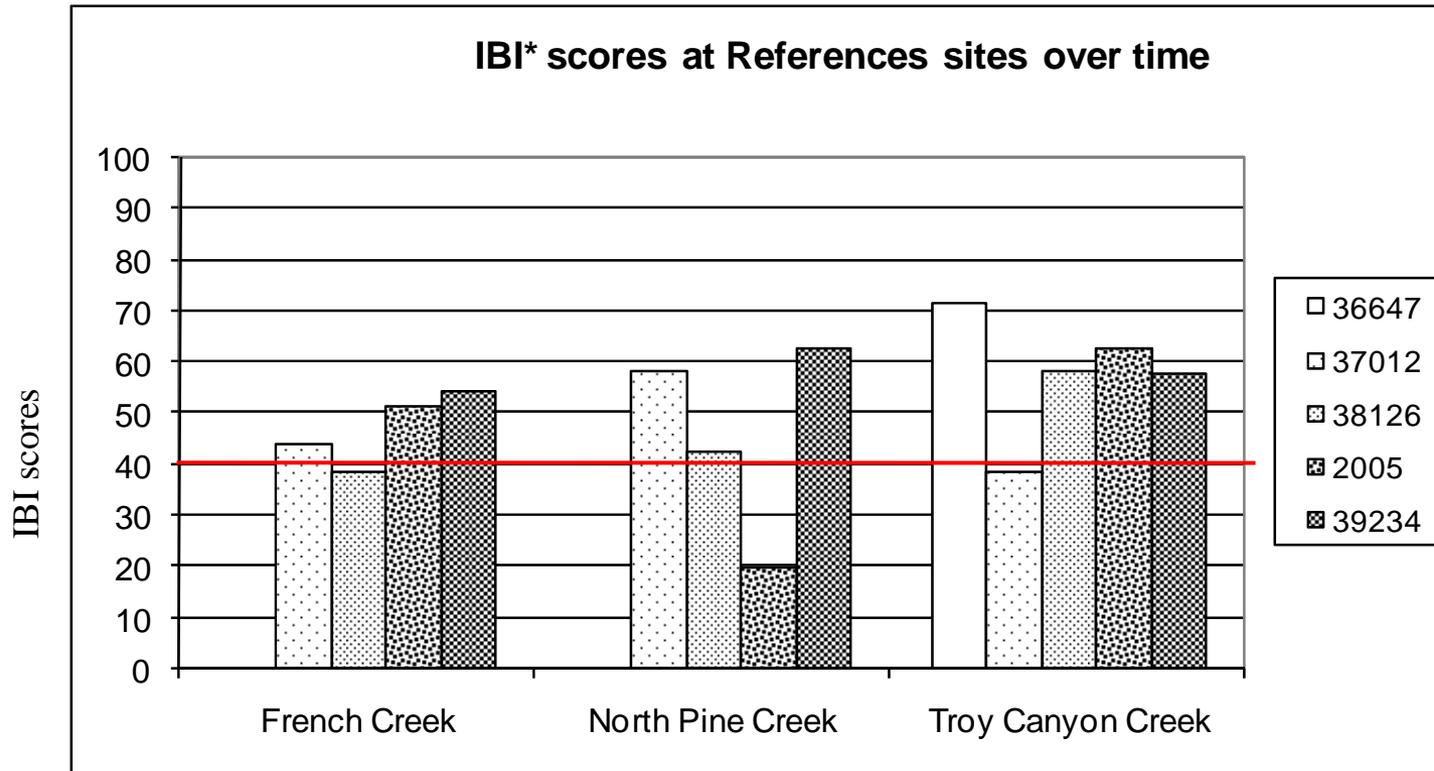


# Ecological Health On Reference Sites in 2007

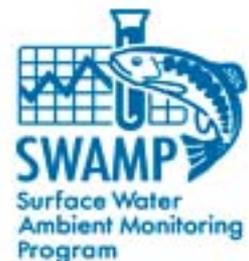
- Fair conditions
- Good conditions



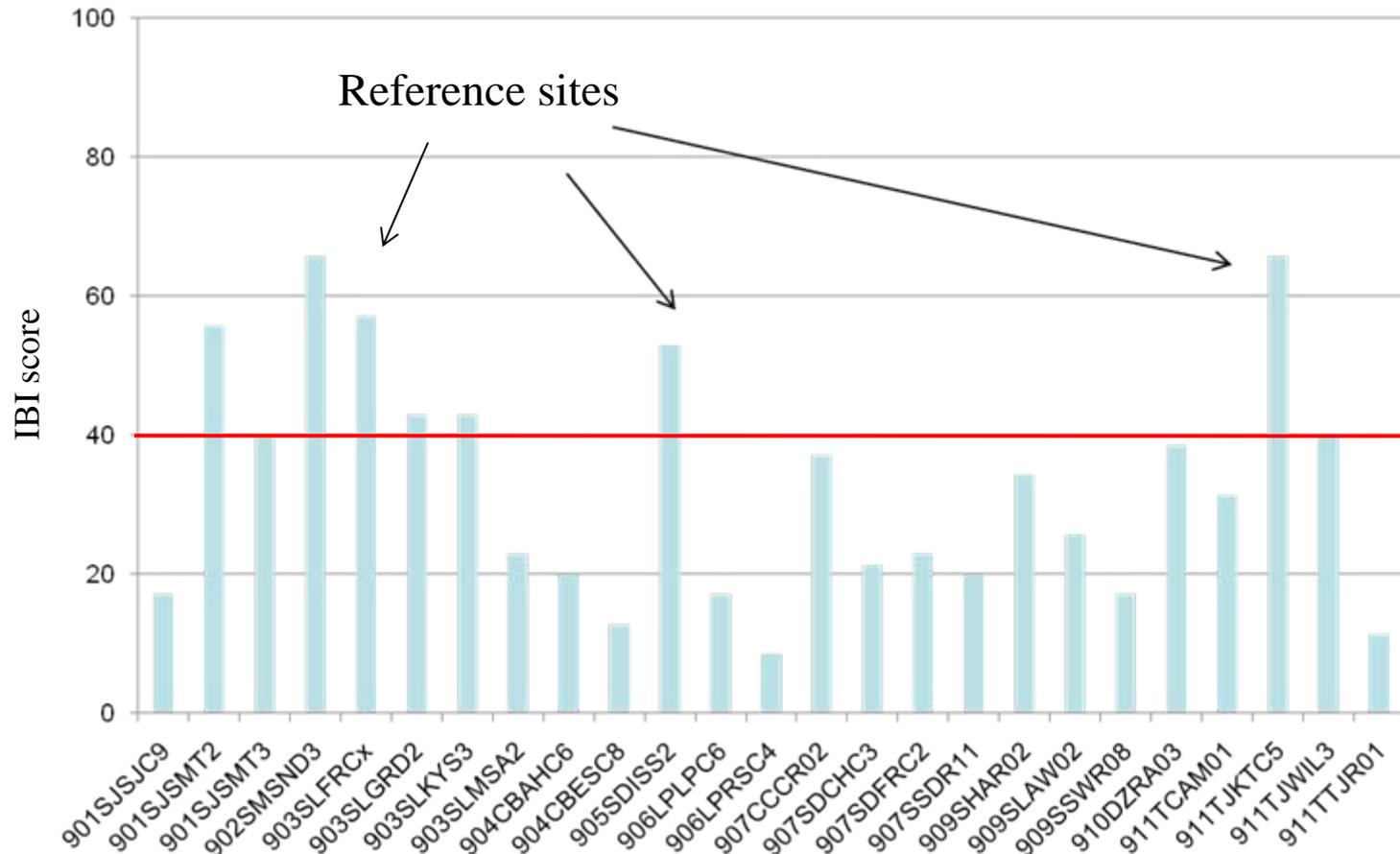
# Ecological Health at Reference Sites over Time



\*IBI = index of biotic integrity, metric of ecological health



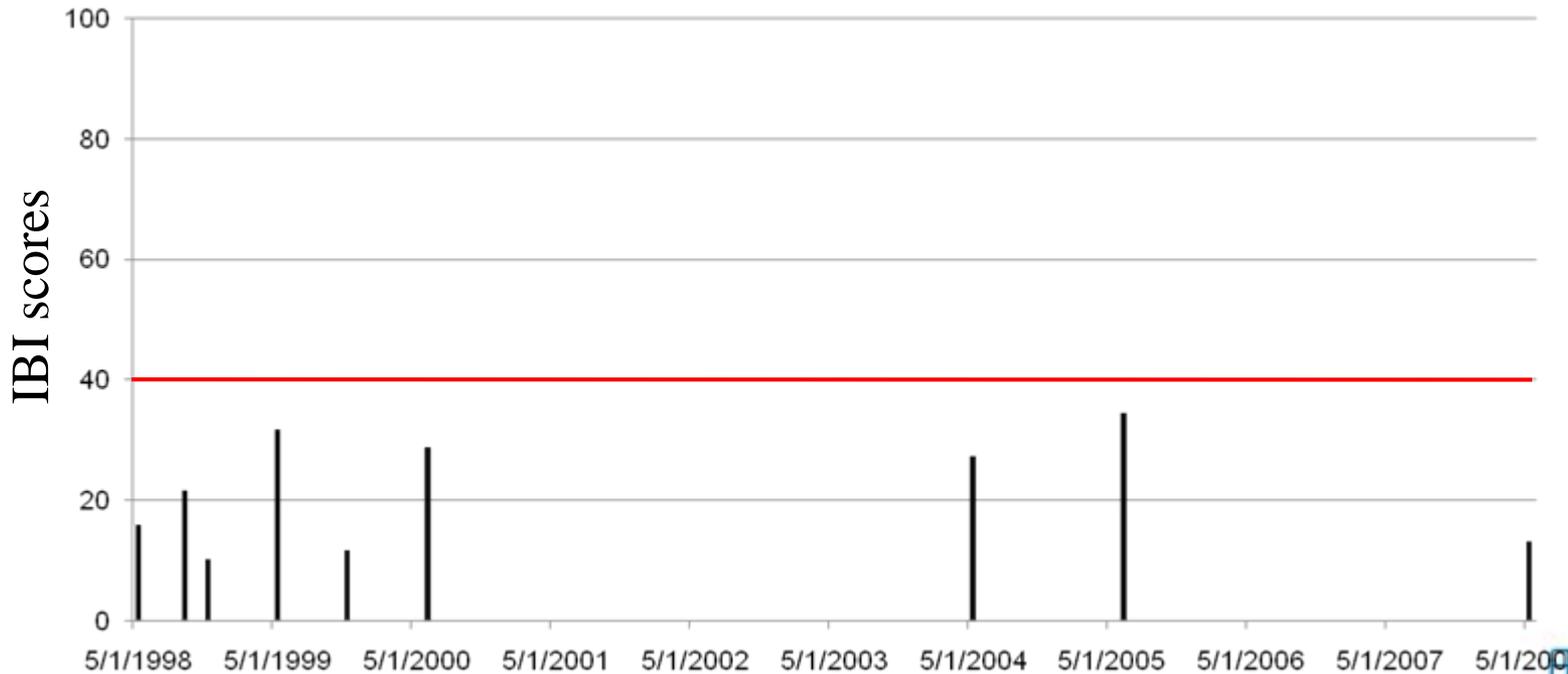
# Ecological Health, 2008 Sampling



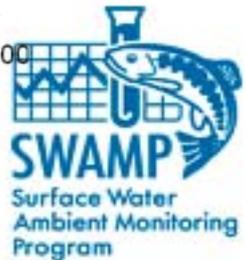
*Sites from north → south*

# Ecological Health Over Time

Escondido Creek, Urban Site



*Time 1998 → 2008*



# Preliminary Conclusions and further Work from the Bioassessment Studies

## Preliminary Conclusions

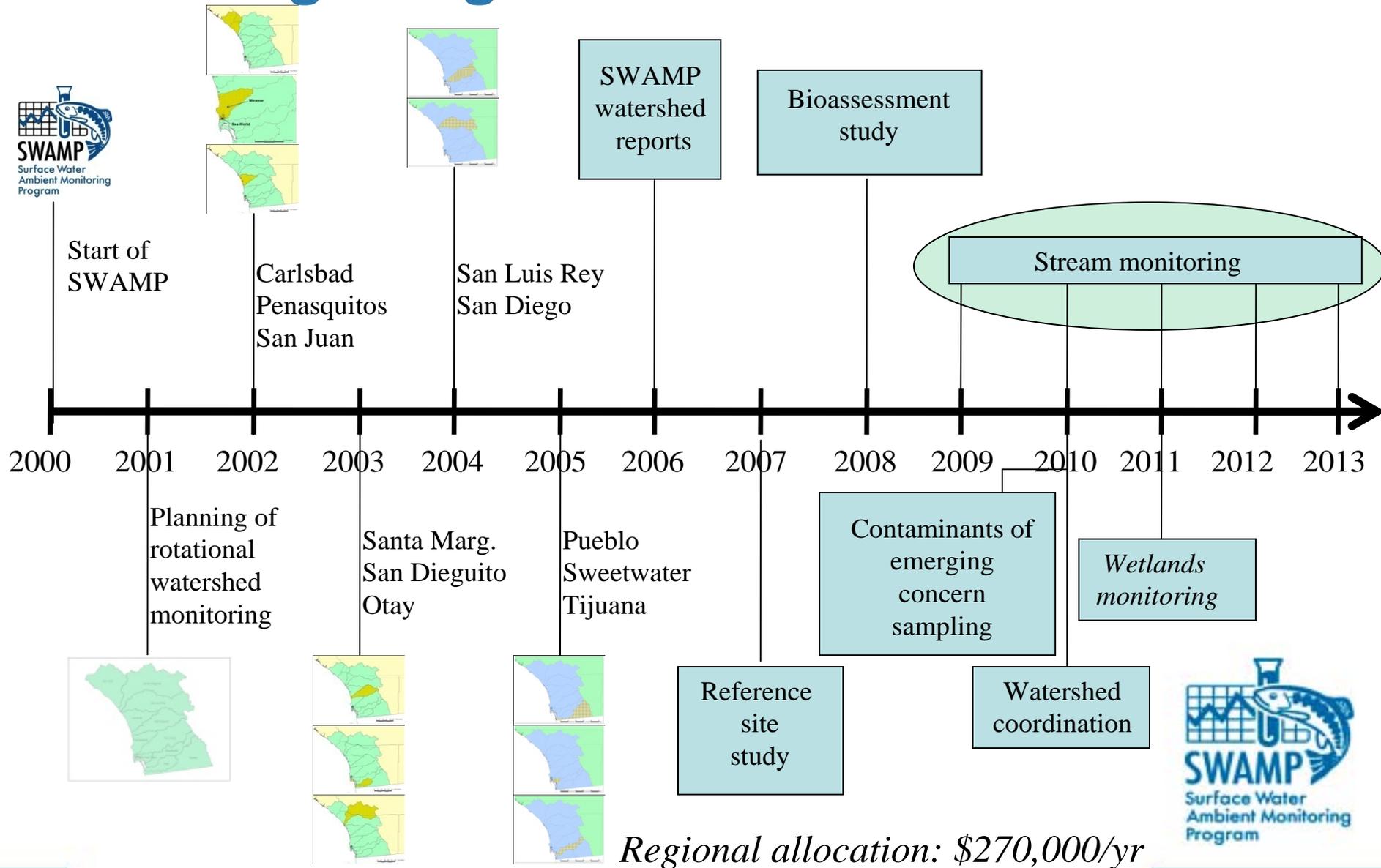
- Reference sites still in fair or good conditions!
- 75% of the sample locations with urban or agriculture land use are in poor or very poor conditions

## Further Work

- More trend analysis over the last 10 years for IBI scores
- More analysis of algae data and caffeine data
- Report on 2007 and 2008 data will be finalized by the end of 2010



# San Diego Region SWAMP Timeline



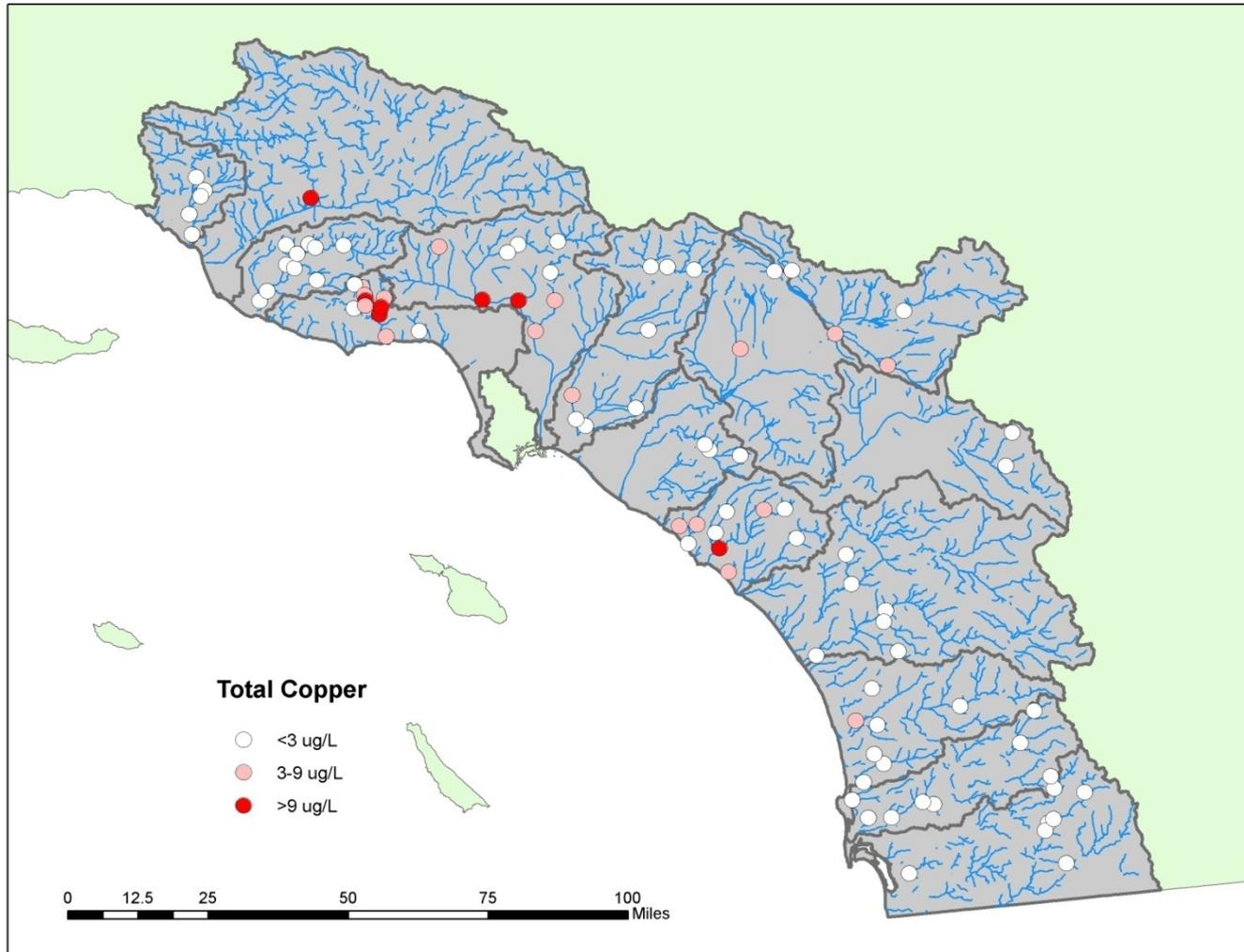
# Regional Bioassessment Study

**GOAL:** Assessment of ecological health of streams in San Diego region watersheds

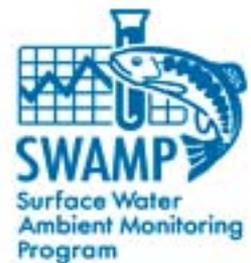
- SMC = Stormwater Monitoring Coalition (“SMC study”)
- Probabilistic design, 5 years, 24 sites per year stratified across land use (open, urban, agriculture)
- southern California-wide study
- Parameters:
  - bioassessment incl. physical habitat (benthic macroinvertebrates and algae)
  - California Rapid Assessment Method (CRAM)
  - water chemistry (nutrients, metals, pyrethroids)
  - water toxicity
- Funding: 2/3 of the sites is funded by San Diego municipal stormwater dischargers, 1/3 is funded by SWAMP



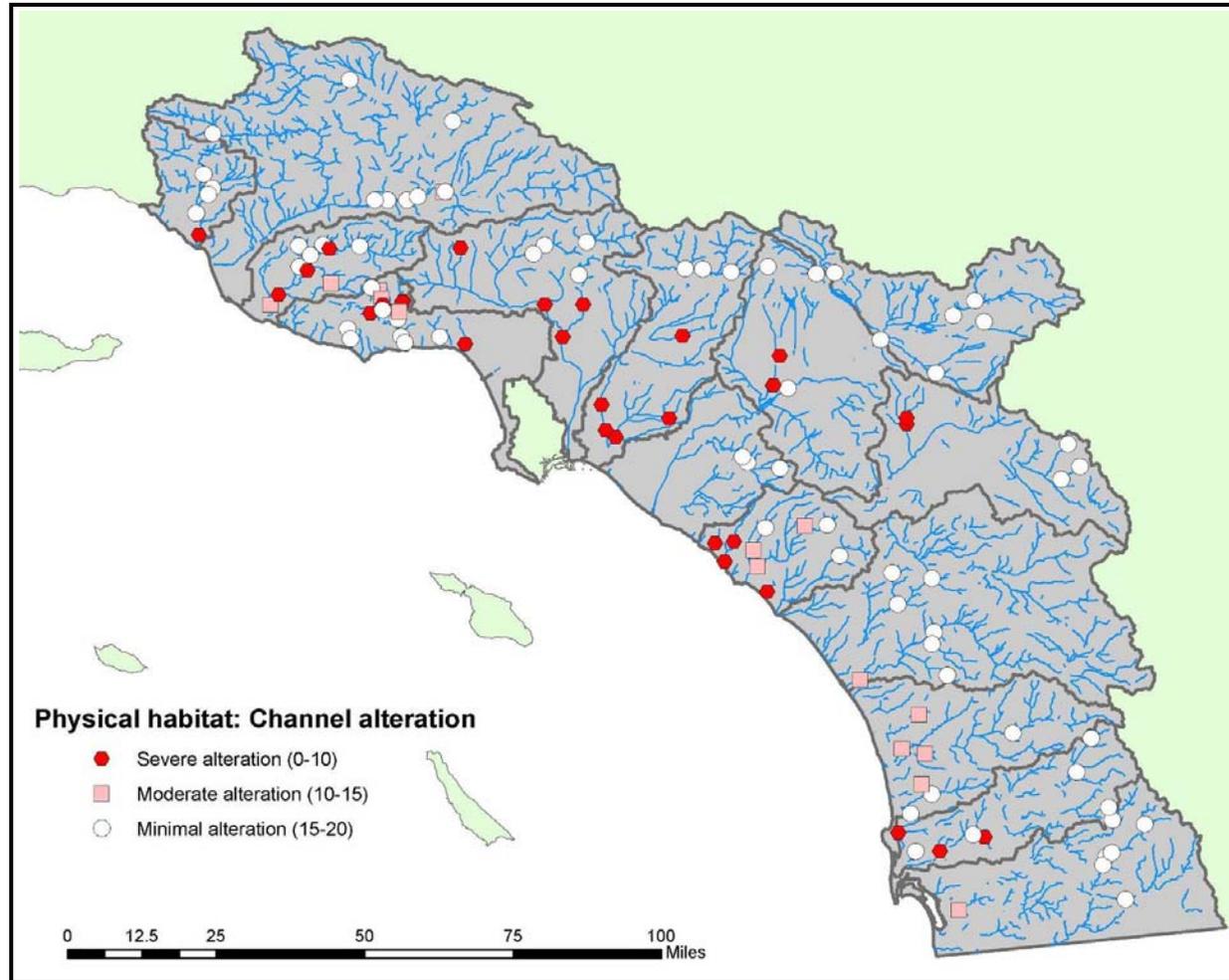
# Total Copper



Highest concentrations in urban areas: Santa Monica, Los Angeles, Santa Clara

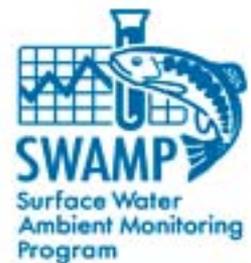


# Physical Habitat

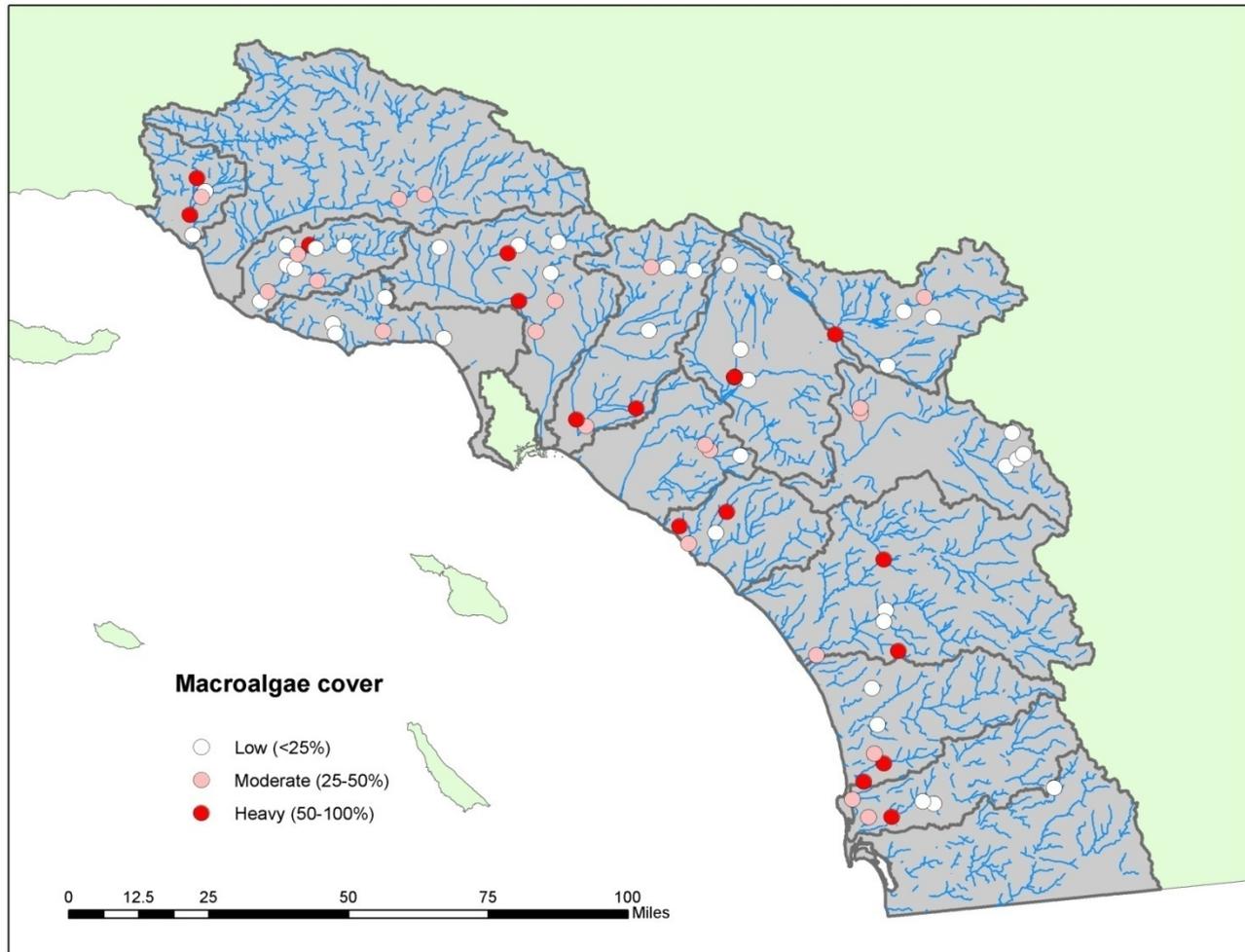


Altered channels near coast and inland urban areas

(Mazor 2010)

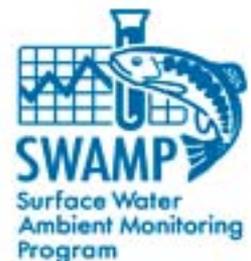


# Macroalgal Cover



High macroalgae cover found throughout the region

(Mazor 2010)

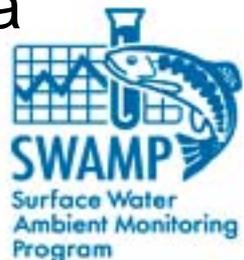


# Data Analysis and Future Sampling for SMC Study

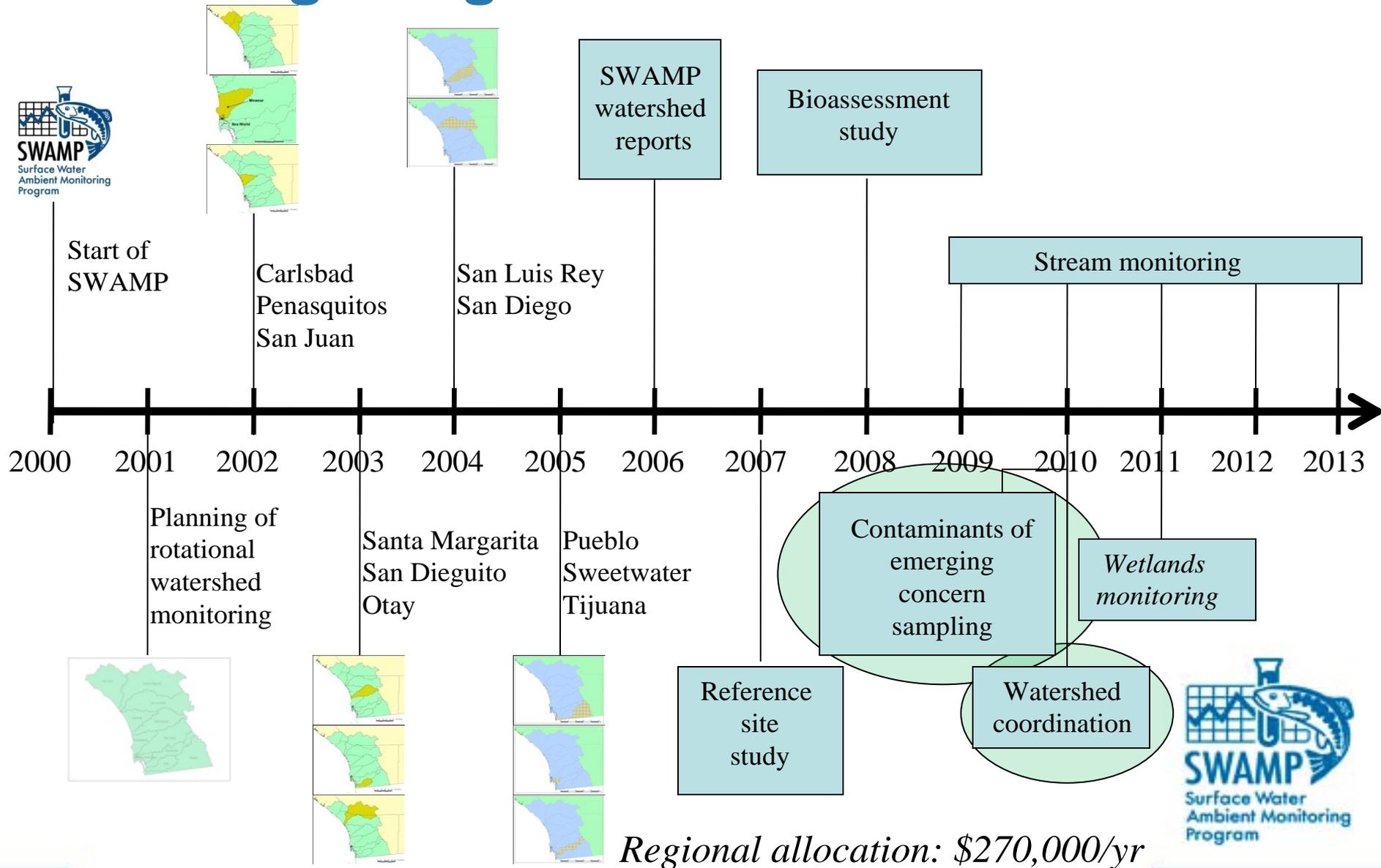
- Data analysis and report will be finalized by the end of 2010.
- Compare data from targeted bioassessment (2001-2006) to probabilistic bioassessment (ongoing)
- 2010 sampling conducted at 47 sites in the San Diego region

## ***Additional constituents this year:***

- sediment chemistry (pyrethroids and metals) at a subset of sites in the San Diego region
- sediment PBDEs (flame retardant) at all SMC sites in the San Diego region



# San Diego Region SWAMP Timeline



# SWAMP Monitoring 2010 and 2011

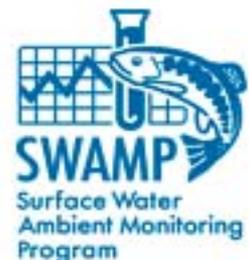
- Improved Watershed Monitoring Coordination in the San Diego River watershed

Goal: develop and implement an integrated and cost-effective monitoring and assessment program in the San Diego region

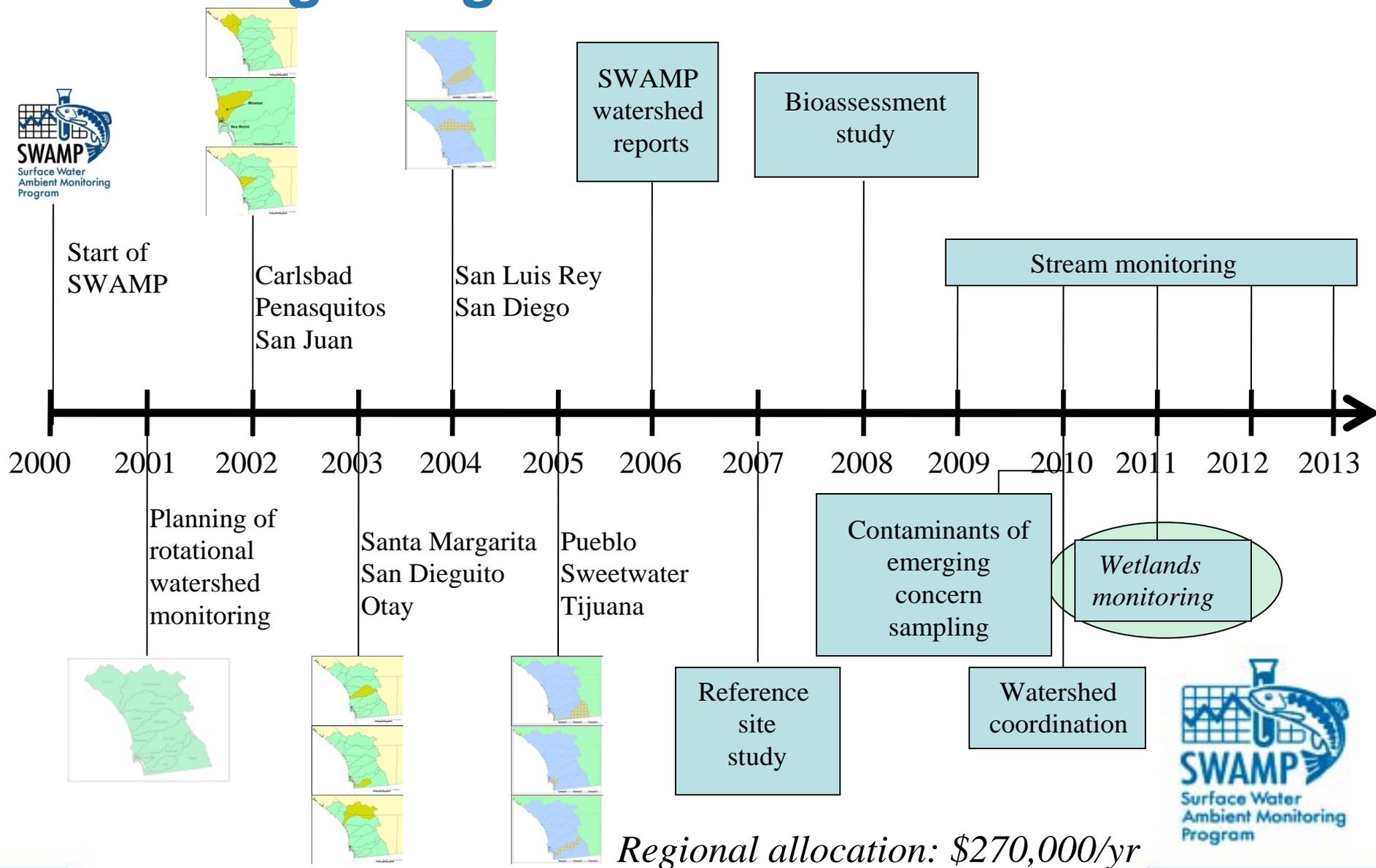
- Pilot Study on Contaminants of Emerging Concern (CEC)

Goal: occurrence and extent of CEC in the San Diego region

- targeted design, streams and lakes/reservoirs
- Pharmaceuticals and Personal Care Products (PPCPs)
- flame retardants (polybrominated diphenyl ethers, PBDEs)
- cyanobacteria and microcystin



# San Diego Region SWAMP Timeline



# Freshwater Wetlands Monitoring

**Goal: Ambient Assessment of Ecological Health of Freshwater Wetlands**

- Freshwater wetlands
- Probabilistic design; sampling will start in 2011, collaboration with the Southern California Coastal Water Research Project and EPA
- Possible indicators:
  - California and National Rapid Assessment Methods (CRAM and RAM)
  - plants
  - sediment toxicity
  - water chemistry
  - bioassessment



# San Diego Region SWAMP future

Status & Trends

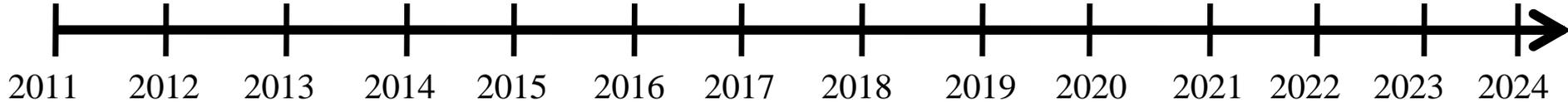
Regional Monitoring programs



Wetlands monitoring (coastal and freshwater)



Stream Monitoring through SMC study



Special Studies

Lake/Reservoir monitoring

Other water bodies

Stressor Identification

Studies on contaminants of emerging concern

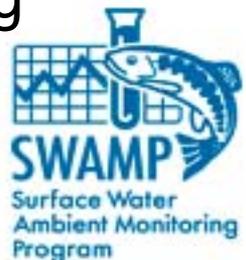
???



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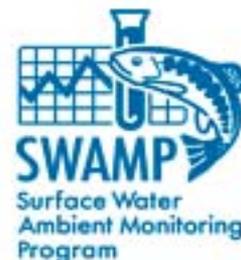
# SWAMP leveraged projects

## ■ Postfire Study

**GOAL:** Assessment of impacts on the ecological health of streams after wildfires in the San Diego region

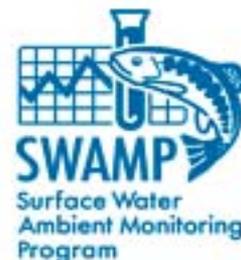
- Sampling after the 2003 and 2007 wildfires in San Diego
- 25 sites in 2003 (baseline data), 2004, 2005, 2007, 2008, and 2009
- sites in non-burned areas, partially burned areas, and fully burned areas
- bioassessment and conventional water chemistry

→ Report on Postfire Study in December 2010, prepared by the California Department of Fish and Game



# SWAMP leveraged projects

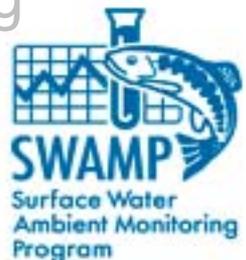
- Coastal Wetlands Eutrophication Study  
**GOAL: extent and occurrence of eutrophication in coastal wetlands in the San Diego region**
    - part of the Bight '08
    - sampling conducted between October 2008 and October 2009
    - 14 coastal wetlands in the San Diego region
    - dissolved oxygen, primary producers, nutrients, harmful algal blooms
- Report on Wetlands Eutrophication Study in December 2011



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# Availability of data, assessments, and reports

- Statewide projects:

[http://waterboards.ca.gov/water\\_issues/programs/swamp/](http://waterboards.ca.gov/water_issues/programs/swamp/)

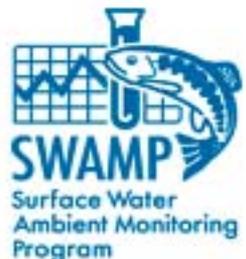
- Regional projects:

[http://waterboards.ca.gov/sandiego/water\\_issues/programs/swamp/](http://waterboards.ca.gov/sandiego/water_issues/programs/swamp/)

- background on R9 SWAMP monitoring
- information on monitoring strategy, monitoring plans, and QAPPs
- watershed reports

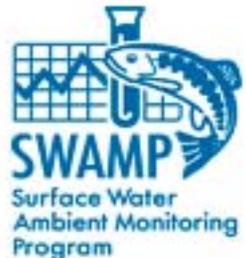
- *COMING SOON:*

- Fact sheets (2 pages)
- Bioassessment report 2007/08
- Caffeine report
- 2009 SMC report
- Postfire report
- Eutrophication report
- Regional Data Portal online



# EcoLayers Software Platform

- Entirely web and services based architecture.
- For integrated, collaborative and adaptive management of the water cycle.
- Across water bodies, jurisdictions and regulatory/stewardship programs
- One web “portal” per individual stakeholder to meet its own needs.
- A network of portals for collaboration between inter-dependent stakeholders



# EcoLayers: Defining the New Paradigm



**Resources + Cost Constraints => Smarter, Integrated Strategies**  
**Integrated Strategies => More Sustainable Solutions**

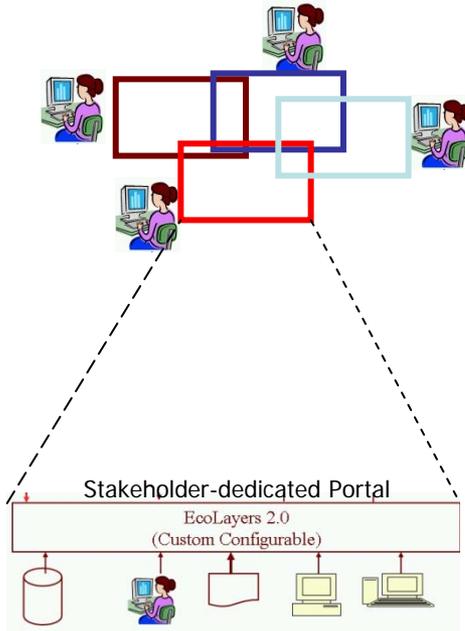
NPDES Permits	Basin Planning	Water Supply	Spills & Clean-ups	Aquifers	Mitigation
MS4 Phase 1 & 2	Water Quality Objectives	CEQA (Water Quality)	Remediation	Lakes	Conservation
Industrial Stormwater	Beneficial Uses	Low Impact Development	Treatment Facilities (BMPs)	River Basins	Invasive Species
Construction Stormwater	Chemical Integrity	Wetlands Impact	Facilities Inspections	Reservoirs	Endangered Species
Non-point Source Discharges	Biological Integrity	401/404 Permits	Incidents Tracking		Trails
Groundwater Discharges	Physical Integrity	Mitigation	Monitoring		
TMDL Development			Sewer System Overflows		
TMDL Implementation					
Discharge Water Quality	Ground & Surface Water Standards	Land Use & Re-development	Site Activities	Water Resources	Habitat

EcoLayers 2.0: Unified Content Aggregation, Process Management & Decision Support Tools for Many Programs



# Inter-dependent Stakeholders: Meeting Shared Goals

## Watershed, Regional, Water Body (aquifer), or Regulation (TMDL)

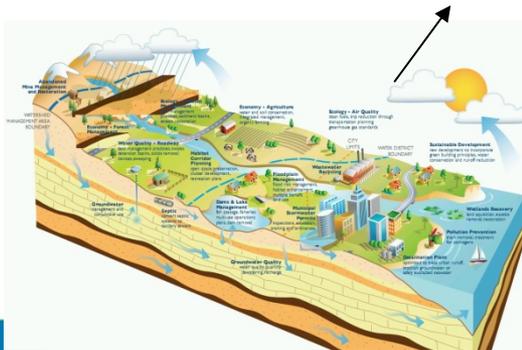


**Governance:** Contractual, partner-as-you-go, coalition, JPA or other form

**Multiple Stakeholders:** Information sharing, integration & collaboration

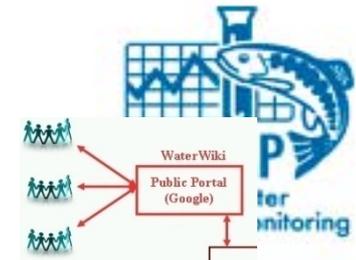
**Stakeholder-level:** Optimize stakeholder objectives

**Stakeholder-level:** Information aggregation, access, visualization and analysis



**Integrate Public Participation**

- WaterWiki®**  
 Google-based Public Portal
- Public outreach
  - Public input
  - On-line tools
  - Community building



# San Diego Data Portal Overview: Content

- **Spatial**

- Region 9 boundary
- San Diego County boundary
- Hydrologic Units 901 to 911 boundaries
- Hydrologic and HAS boundaries in each hydrologic unit
- Rivers in San Diego County
- Lakes in San Diego County
- 303(d) impaired waters – Streams and water bodies
- Land use – San Diego County East for San Diego River Watershed only
- Parcels East – for San Diego River Watershed
- Rain contours

- **Data**

- SWAMP
- Stormwater: Dry weather, wet weather, bioassessment, Coastal Storm Drain
- 401 Projects
- CIWIQS data: CONSTW, INDSTW, NON15, NPDES, etc.
- USGS sites: Stream, lakes and groundwater sites
- 303(d) data: Streams and Water bodies
- NGOs: RiverWatch and Stream Team data

- **Other**

- Links to other websites
- Data from other websites (real-time, other)
- Geospatially referenced user inputs
- Documents, photos, etc.



# Portal Overview: Potential Uses

- Access to primary information
- Search, visualize and interpret data *in context of the user's problem*
- Education, outreach and research
- Improve and lower cost of watershed-level monitoring
- Feedback and permit comments to Waterboard
- Identify sources of pollution
- Assess effectiveness of regulatory programs
- Information sharing and collaboration
- Integrated watershed management with stakeholder participation
- Permit application and compliance



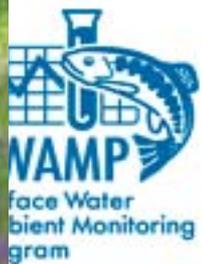
# Portal Overview: Many Data Sets

A Comprehensive Collection of Water Quality Data

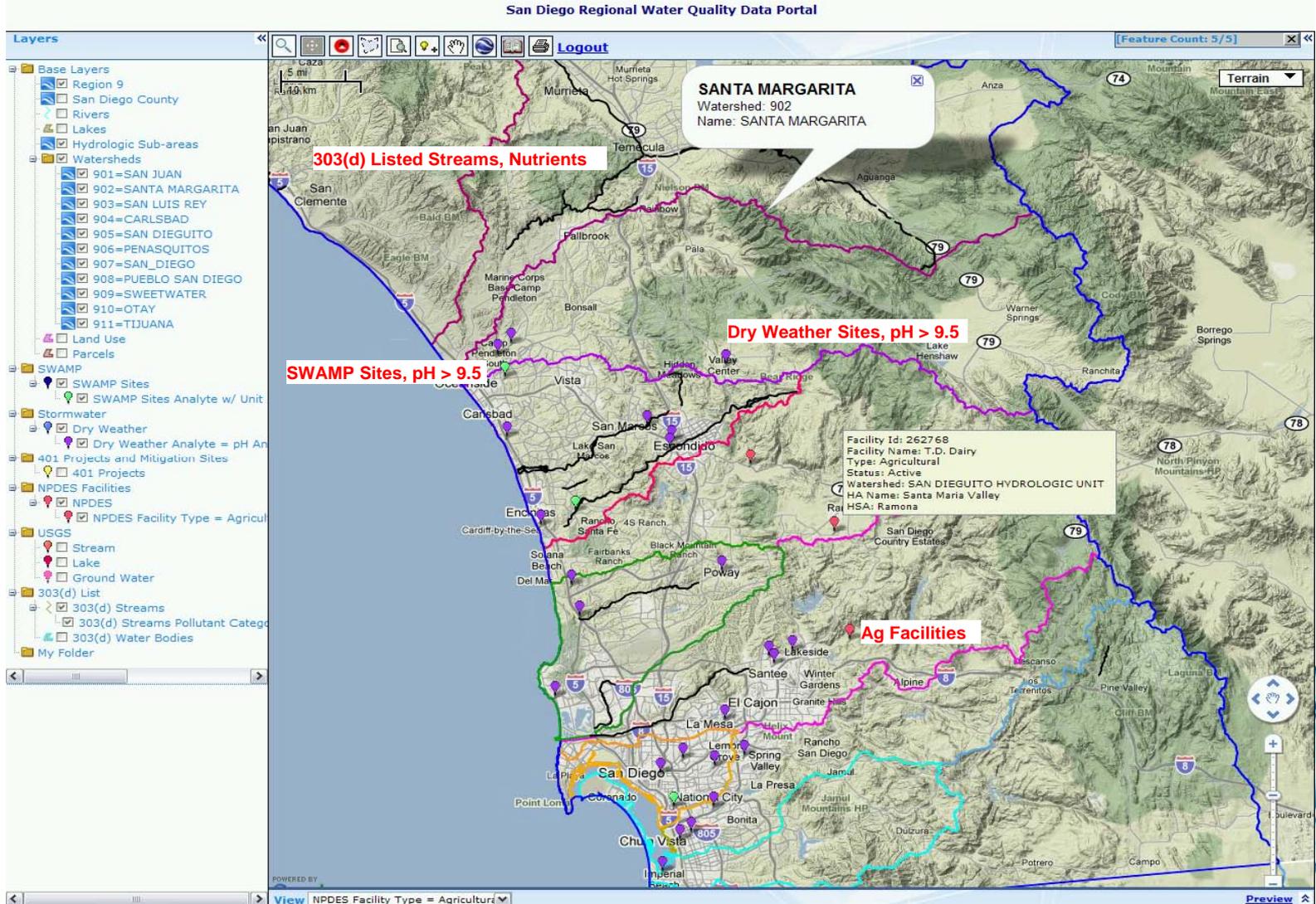
The screenshot displays the "Welcome to the San Diego Regional Water Quality Data Portal" interface. It is divided into two main columns for selection:

- Select Watershed First:** A list of hydrologic units with checkboxes. "All Watersheds" is checked. Other units include SAN JUAN, SANTA MARGARITA, SAN LUIS REY, CARLSBAD, SAN DIEGUITO, PENASQUITOS, SAN DIEGO (with sub-units Lower San Diego, San Vicente, El Capitan, Boulder Creek), PUEBLO SAN DIEGO, SWEETWATER, OTAY, and TIJUANA.
- Select Water Quality Program:** A tree view of data categories with checkboxes. "SWAMP" is checked, including "SWAMP Sites" (with sub-categories: Bioassessment (Test) with Very Good, Good, Average, Poor, Very Poor, No Data; Stormwater with Dry Weather, Copermittee, Coastal Storm Drain, Bioassessment; 401 Projects and Mitigation Sites with 401 Projects, Mitigation Sites; NPDES Facilities with CONSTW, INDSTW, NON15, NPDES; USGS with Stream, Lake, Ground Water; and 303(d) List with 303(d) Streams, 303(d) Water Bodies).

At the bottom left is a link for [Instructions](#) and at the bottom right is a link for [Load Map](#).



# User Customizes Map & Data Sets



# Rich Reporting & Visualization

## San Diego Regional Water Quality Data Portal

**Layers**

- Base Layers
  - Region 9
  - San Diego County
  - Rivers
  - Lakes
  - Hydrologic Sub-areas
  - Watersheds
    - 901=SAN JUAN
    - 902=SANTA MARGARITA
    - 903=SAN LUIS REY
    - 904=CARLSBAD
    - 905=SAN DIEGUITO
    - 906=PENASQUITOS
    - 907=SAN\_DIEGO
    - 908=PUEBLO SAN DIEGO
    - 909=SWEETWATER
    - 910=OTAY
    - 911=TIJUANA
  - Land Use
  - Parcels
- SWAMP
  - SWAMP Sites
  - SWAMP Sites Analyte w/ Unit
- Stormwater
  - Dry Weather
  - Dry Weather Analyte = pH And
- 401 Projects and Mitigation Sites
  - 401 Projects
- NPDES Facilities
  - NPDES
  - NPDES Facility Type = Agricultural
- USGS
  - Stream
  - Lake
  - Ground Water
- 303(d) List
  - 303(d) Streams
  - 303(d) Streams Pollutant Category
  - 303(d) Water Bodies
- My Folder

Site Id: SLR08  
 Location: Moosa Canyon Creek @ Sunday Drive  
 Watershed: SAN LUIS REY HYDROLOGIC UNIT  
 HA Name: Lower San Luis  
 HSA: 903.14

[Public Comment](#)  
[View Data and Reports](#)  
[View Water Quality Objectives](#)

**View Data and Reports**

**Reports** | Group Reports | Histograms

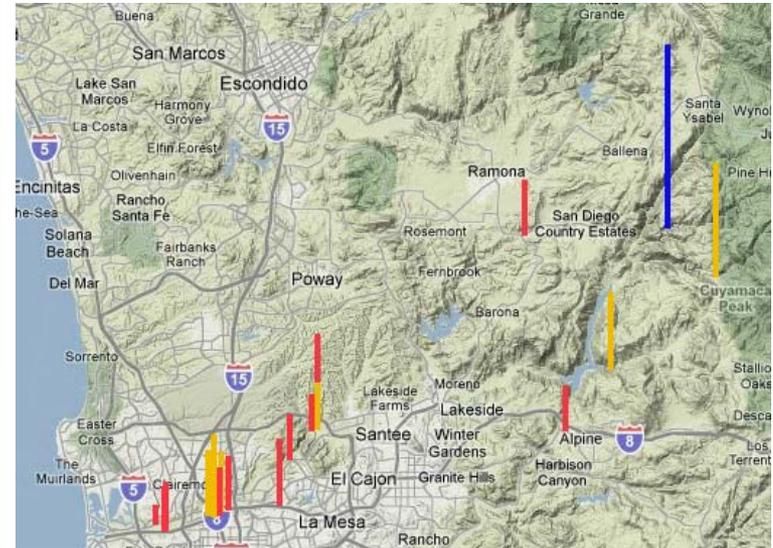
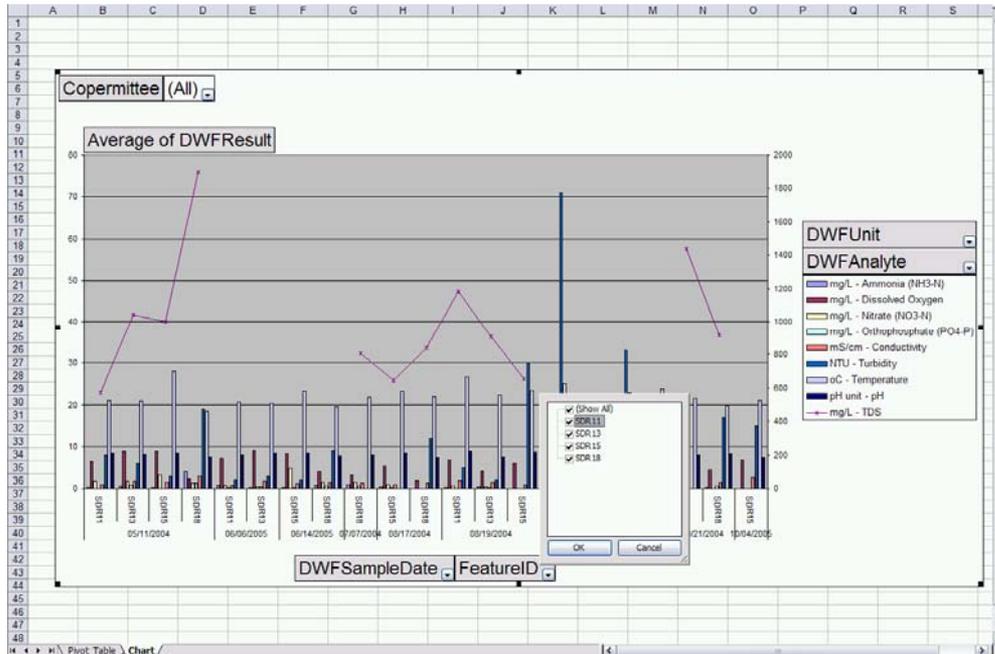
Item Reports: Moosa Canyon Creek @ Sunday Drive

- \* [Field Data](#)
- \* [Lab Data](#)
- \* [Visual Data](#)

**View** Dry Weather Analyte = pH And Result > 9.5 [# Rows: 27] [Preview Item Report](#)

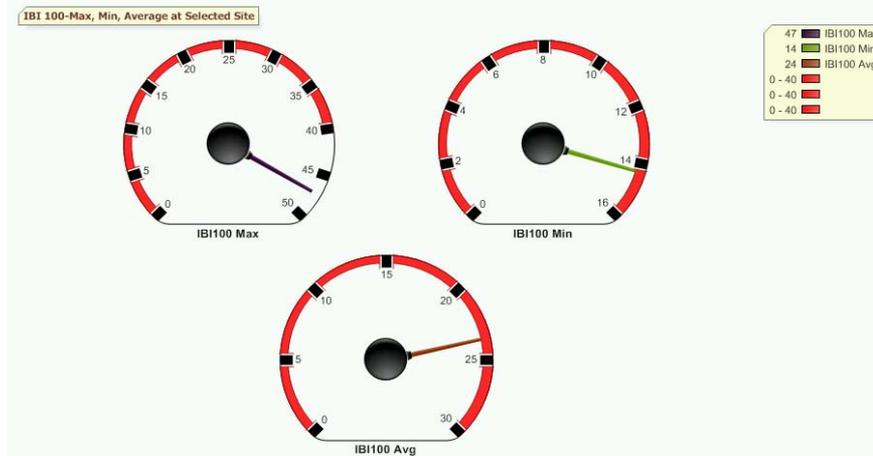
SWAMP	HA Name	HSA
SWAMP Sites Analyte w/ Unit - Field = pH none And Result - Field > 9.5	AGRIC UN Poway	906.

# Rich Reporting & Visualization



**Title:** IBI 100-Max, Min, Average at Selected Site

**Description:** MAXIMUM, MINIMUM AND AVERAGE VALUES OF IBI 100 AT SELECTED SITE



# Rich Reporting & Visualization

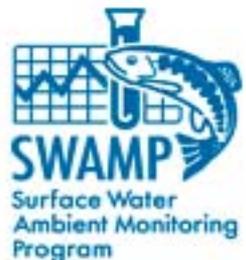
Average of Result		Analyte						
Site ID	Sample Date	Copper,Dissolved ug/L	Lead,Dissolved ug/L	Manganese,Dissolved ug/L	Nickel,Dissolved ug/L	Survival %	Total Cell Count cells/ml	
901SJENG2	10/28/2002	3.54	0.02	8.79	2.83	42.5	6523000	
	1/13/2003	3.74	0.059	18.1	4.28	47.66666667	5453000	
	4/14/2003	4.49	0.0795	1.565	1.35	68	4303000	
	5/12/2003	5.32	0.025	6.52	1.49	85	3430000	
904CBESC8	3/13/2002	2.94	-0.01	131	0.638	90	5378000	
	4/24/2002	3.17	-0.01	153	1.19	66.66666667	5623000	
	6/4/2002	3.45	0.025	174	1.45	68	4148000	
	9/17/2002	2.45	0.027	88	2.13	57.77777778	7553000	
904CBLAC3	3/12/2002	1.68	-0.01	123	0.67	67.5	1128000	
	4/22/2002	2.58	-0.01	64.1	1.99	62	1218000	
	6/3/2002	1.95	0.011	85.2	4.04	63.33333333	938000	
	9/16/2002	2.27	0.00738	208	3.14	55.55555556	743000	

## Project Documents

Proj ID	Date	Submitted By	Title	File Name	File Size	Source
09C-075	09/21/2009		PRIVATE CONCRETE GRADE CROSSING; 401 WATER QUALITY CERTIFICATION 09C-075	<a href="#">249138.pdf</a>		SDRWQCB
09C-047	06/12/2009	BRUCE APRIL	VIA MONSERATE CULVERT REPLACEMENT PROJECT, 09C-047	<a href="#">65463.PDF</a>		SDRWQCB
09C-015	02/19/2009	BRUCE APRIL	401 WATER QUALITY CERTIFICATION VOLUME 3 09C-015	<a href="#">56954.pdf</a>		SDRWQCB
09C-015	02/19/2009	BRUCE APRIL	401 WATER QUALITY CERTIFICATION VOLUME 2 09C-015	<a href="#">56951.pdf</a>		SDRWQCB
09C-015	03/11/2009	CHIARA CLEMENTE	WATER QUALITY CERTIFICATION FOR STATE ROUTE 76 - MELROSE DRIVE	<a href="#">58471.PDF</a>		SDRWQCB
09C-015	03/19/2009	GLADYS T. BAIRD	401 PERMIT, 09C-015	<a href="#">58848.PDF</a>		SDRWQCB
09C-015	02/19/2009	BRUCE APRIL	401 WATER QUALITY CERTIFICATION 09C-015	<a href="#">56950.pdf</a>		SDRWQCB
09C-015	02/19/2009	BRUCE APRIL	401 WATER QUALITY CERTIFICATION VOLUME 4 09C-015	56961.pdf		SDRWQCB
09C-015	05/12/2009	JOHN ROBERTUS	ACTION ON REQUEST FOR CLEAN WATER ACT SECTION 401 WATER QUALITY	<a href="#">62951.pdf</a>		SDRWQCB
08C-068	03/17/2009	KATHY ROGERS	CITY OF VISTA STORM WATER CONVEYANCE SYSTEM MAINTENANCE PROJECT	<a href="#">59162.PDF</a>		SDRWQCB
08C-068	03/26/2009	JOHN H. ROBERTUS, EXECUTIVE OFFICER	ACTION ON REQUEST FOR CLEAN WATER ACT SECTION 401 WATER QUALITY	<a href="#">59149.PDF</a>		SDRWQCB
08C-068	09/16/2008	JOHN CONLEY	PERMIT APPLICATION PACKAGE CITY OF VISTA STORM WATER CONVEYANCE	<a href="#">45182.pdf</a>		SDRWQCB
08C-064	03/11/2009	JOHN ROBERTUS	WATER QUALITY CERTIFICATION FOR THE SAN LUIS REY RIVER TRAIL EXTENSION	58617.PDF		SDRWQCB
08C-064	09/09/2008	CHIARA CLEMENTE, SENIOR ENVIRONMENTAL	SAN LUIS REY RIVER TRAIL EXTENSION AND SEWER ACCESS ROAD IMPROVEMENT	<a href="#">44168.PDF</a>		SDRWQCB
08C-064	08/25/2008	NATHAN MERTZ	401 CERT - SAN LUIS REY RIVER TRAIL EXTENSION AND SEWER ACCESS	<a href="#">43090.PDF</a>		SDRWQCB
08C-064	04/06/2009	STEVEN HONGOLA	MITIGATION EXHIBIT FOR THE SAN LUIS REY RIVER TRAIL PROJECT	<a href="#">61995.PDF</a>		SDRWQCB
08C-033	05/12/2008	STEVE DELANEY	LILAC DEL CIELO SECTION 401 CERTIFICATION	<a href="#">32942.PDF</a>		SDRWQCB
08C-033	06/24/2008	CHIARA CLEMENTE, SENIOR ENVIRONMENTAL	WATER QUALITY CERTIFICATION FOR LILAC DEL CIELO - FILE NUMBER 08	<a href="#">35546.PDF</a>		SDRWQCB

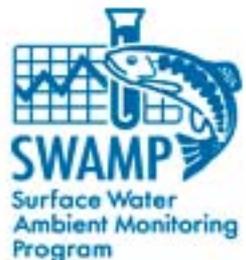
# How is the SDRWQ Portal Different?

- Portal content, its ownership and its use all stakeholder driven
- Emphasis is on content integration, usability, decision support, customizable user experiences, permission-based sharing
- Affordable and easy to use by all
- Portal part of a network-based, decentralized architecture (Web 3.0)
- Supports public participation (two-way)
- Can be replicated at stakeholder, group (e.g., TMDL), watershed or regional levels to meet diverse needs
- Adaptive to changes in stakeholder needs and the ecosystem



# Future Plans

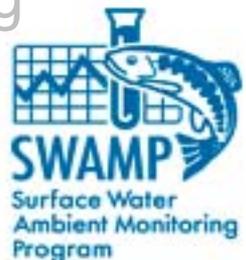
- Enhanced decision support tools
- Regional integration with stakeholder or other dedicated portals, e.g., wastewater
- Operations economically self-sustaining through value delivered to stakeholders



# Outline

**GOAL: Inform stakeholders on SWAMP monitoring activities in the San Diego region**

1. Background on the San Diego region
2. Introduction into SWAMP
3. Statewide SWAMP monitoring
4. San Diego region's SWAMP monitoring
  - a. past projects: 2001-2008
  - b. current projects: 2009-2010
  - c. future projects: 2011-
5. San Diego region's SWAMP leveraged monitoring
6. Availability of data, assessments, and reports
7. Use of San Diego region's SWAMP data

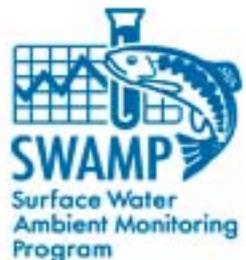


# Use of San Diego region's SWAMP data

- Strategic Planning and Management Decisions (e.g. Tijuana River watershed; Orange County Stormwater Permit)
- Ecological health assessments
- 303d listings and 305b report

→ *With (1) better monitoring (new programs) and (2) better accessibility of data (through data portal) and (3) better communication (fact sheets and reports), there will be a better use of SWAMP data and a better understanding of conditions of the San Diego region waters*

**Monitoring of ambient waters will answer the question if the water quality programs (regulatory and non-regulatory) work!**



# THANK YOU!

Any comments, suggestions, or questions,  
please contact:

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*or*

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